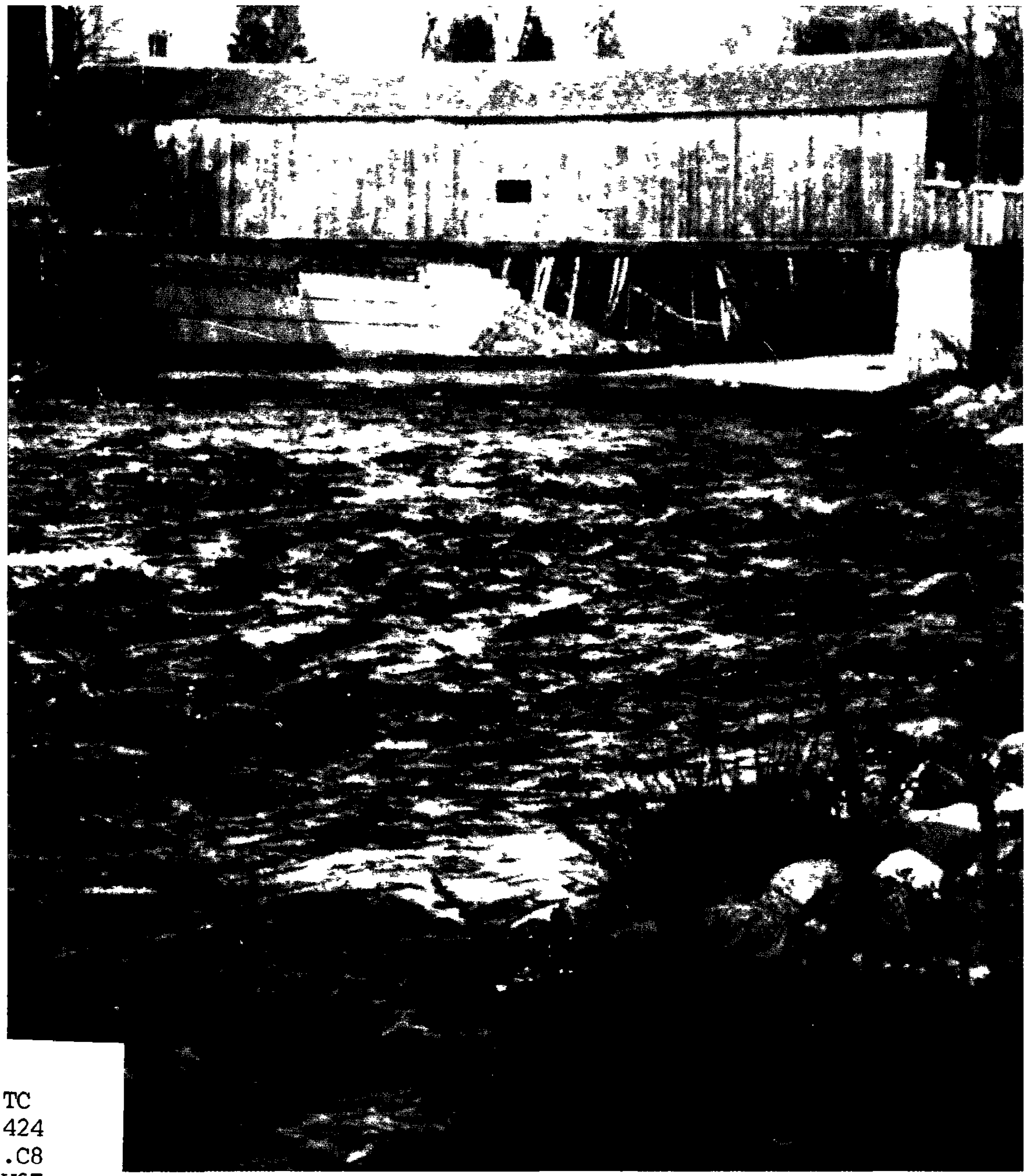
US Army Corps
of Engineers
New England Division

Water Resources Development



Connecticut 1991

On the Cover: *The shore protection project on the Salmon River at Colchester and East Hampton*

The work of the U.S. Army Corps of Engineers in Connecticut 1991

This booklet presents a brief description of water resources projects completed by the U.S. Army Corps of Engineers in Connecticut. It describes the role of the Corps in planning and building water resource improvements and explains the procedure leading to the authorization of such projects.

For ease of reference, the material is arranged according to the type of project, i.e. flood damage reduction, navigation, or shore and bank protection. There is also a reference at the end of the booklet that lists Corps' projects by community. A map showing the location of all Corps projects in the state is provided on the underleaf of this page.

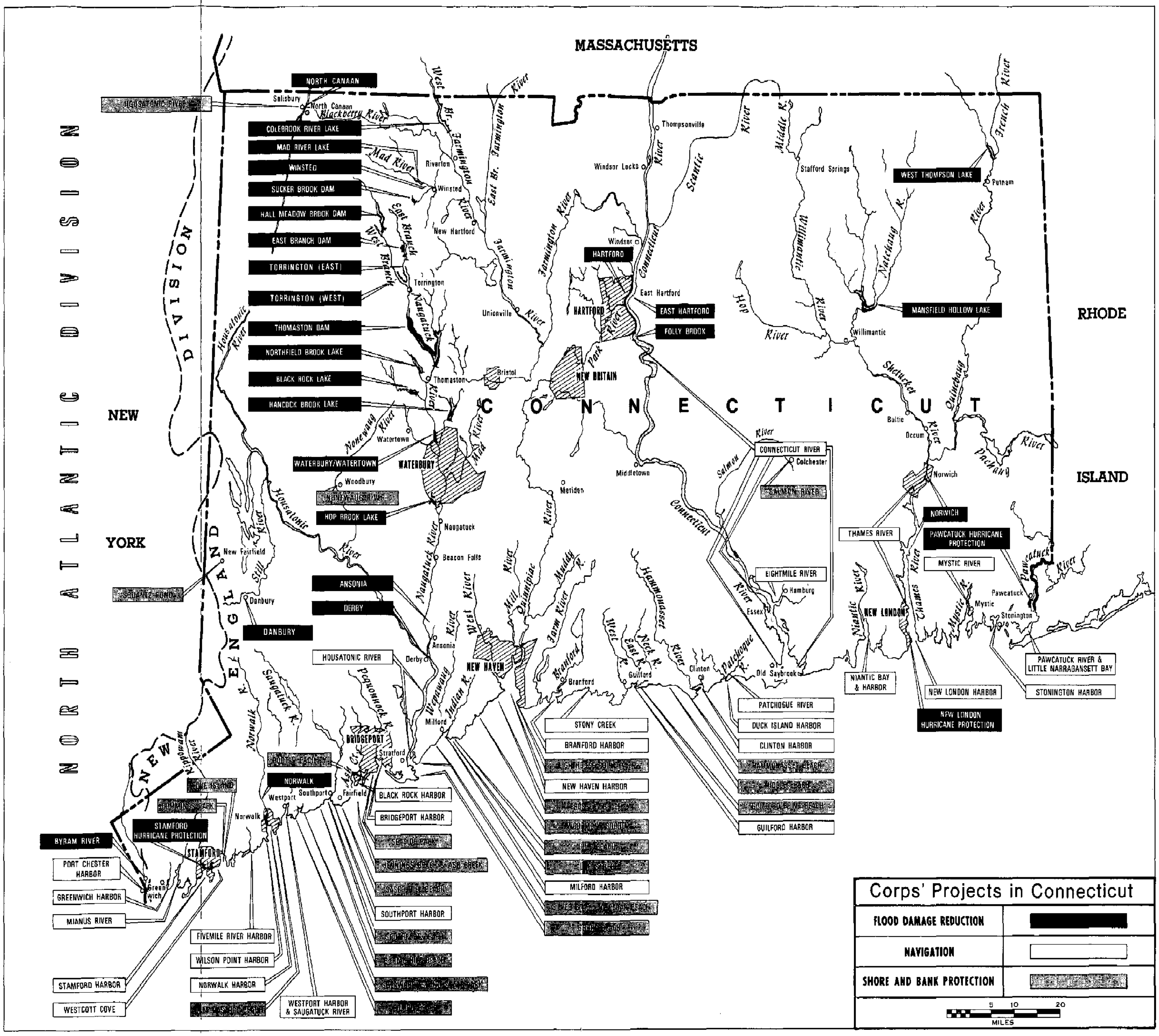
The Corps of Engineers water resources development program exerts a significant impact on Connecticut's physical, economic, and social environment. This publication affords citizens the opportunity to learn about the various projects and to determine how they can participate in decisions regarding present and future activities.

For further information, call the Corps of Engineers at 617-647-8777, or write:

U.S. Army Corps of Engineers
New England Division
Public Affairs Office
424 Trapelo Road
Waltham, MA 02254

US Army Corps of Engineers
New England Division

This publication is authorized by the Secretary of the Army as required by PL 99-662.



DEPARTMENT OF THE ARMY CORPS OF ENGINEERS, NEW ENGLAND DIVISION WALTHAM, MA.

US Army Corps of Engineers
New England Division

For more than 216 years, the missions and accomplishments of the U.S. Army Corps of Engineers have closely reflected the needs and wants of a growing, changing nation. For much of this time, the Corps has played a major role in our nation's water resources development, including navigation, flood control, water quality and supply, recreation and related projects.

Although the driving force behind our water resources development mission has remained constant—providing quality service to the nation there have been several challenging adjustments in how we meet this requirement.

One such change was the introduction of non-federal cost sharing in the Water Resources Development Act. Though legislatively reaffirmed in the subsequent acts of 1988 and 1990, the true value of cost-shared development can be measured by the many successful projects of this partnership and the healthy water resources program it ensures for the future.

Another challenge we have faced recently is the increased public concern for their environment. We have always complied with environmental laws and regulations and managed our projects as a trust we hold for the future. Compliance, however, is no longer enough. We are taking an active position to not only protect but enhance our fragile environment.

The Secretary of the Army has been directed to include environmental protection as one of our primary missions, and the Water Resources Development Act of 1990 established a "no net loss" policy as an essential part of all water resources development. In addition to making environmental considerations as important as engineering and economic considerations for new start projects, we are taking a new look at existing projects to determine how they can be environmentally improved.

Looking ahead to the needs of our nation, we are taking a lead role in helping rebuild our nation's aging infrastructure. The U.S. Army Corps of Engineers has always been at the forefront of infrastructure development in the United States exploring new territory for settlement, surveying transportation routes and opening rivers to navigation. While we work to restore and strengthen the vital links in our infrastructure, we are also exploring new methods to meet increasing and varying national requirements. One such effort is a joint federal, non-federal demonstration project to determine the feasibility of a U.S. developed and built high-speed magnetic levitation transportation system.

We have also been working actively with the construction industry on a cost-shared Construction Productivity Advancement Research Program. This program has the double benefits of increasing the U.S. construction industry's competitive ability in the international market while providing more effective techniques, equipment and processes for federal and non-federal projects in the United States

With these initiatives, we are building on the Corps' traditions of professionalism and service to meet the needs of our nation for another 200 years. We are proud of the partnerships we have forged, and look forward to an exciting, rewarding future in water resources development.

This booklet is one in a series detailing water resources programs in the 50 states and U.S. possessions. I hope you find it interesting and feel some pride of ownership.

H.J. HATCH
Lieutenant General, USA
Commanding

US Army Corps of Engineers
New England Division

The U.S. Army Corps of Engineers has a long and proud history of applying its expertise in engineering and related disciplines to meet the Nation's needs. Over the years, those needs have evolved, from such 19th Century activities as exploration, pathfinding and lighthouse construction to such modern missions as hazardous and toxic waste removal and environmental improvement. The central focus of its Civil Works mission, however, has, from its earliest days, been development of the Nation's water resources.

The water resource projects developed by the Corps of Engineers, in cooperation with State and local project sponsors, have proven themselves time and again as wise investments of public funds, returning to the public in benefits—low cost transportation, flood damages prevented, etc.—far more than their cost to plan, build and operate. As a result, the Civil Works program enjoys a high degree of credibility within the Administration, and with Congress. With a program of more than $3.5 billion in Fiscal Year 1991, the Civil Works program was one of the very few "domestic discretionary" activities of the Federal government to receive an increase in funding that year.

Yet, proud as we are of the respect this program commands within the Federal government, we are even prouder of the trust that our partners the States, local governments, port authorities, water management districts and other local project sponsors place in us.

Each Corps of Engineers project is the product of an orderly study and design process. Under provisions of the Water Resources Development Act of 1986, sponsors demonstrate their commitment early in the project development process by agreeing to joint funding of the feasibility study upon which a project's construction authorization will be based, and to cost sharing of the project's construction once it is authorized. To date, more than 150 non-Federal sponsors have signed Local Cooperation Agreements for studies or congressionally authorized projects.

The engineering expertise and responsiveness of the Corps of Engineers, gained in the Civil Works and Support for Others programs as well as in its military construction role, has stood the Nation in good stead from Alaska, where it participated in the oil spill cleanup; to Puerto Rico, the Virgin Islands and the Southeastern States, where it spearheaded recovery efforts after Hurricane Hugo; to California in the aftermath of the Loma Prieta Earthquake; to the Midwest and California as they deal with continuing drought; to Panama and the Middle East in Operations JUST CAUSE and DESERT SHIELD/DESERT STORM; to dozens of other locations. Whatever challenges arise in the years and decades ahead, I have no doubt that the Army Corps of Engineers will be equal to the task.

G. Edward Dickey
Acting Principal Deputy
Assistant Secretary of the
Army (Civil Works)

Table of Contents

A. U.S. ARMY CORPS OF ENGINEERS PROGRAMS AND SERVICES 1

I. Civil Works Overview 3
- Introduction 4
- Authorization and Planning Process for Water Resource Projects 6
- Navigation 6
- Flood Control and Flood Plain Management 7
- Flooding in New England 9
- Reservoir Control Center 14
- Shore and Hurricane Protection 16
- Hydropower 17
- Water Supply 18
- Environmental Quality 18
- Regulatory Programs 19
- Recreation 20
- Emergency Response and Recovery 21

B. DESCRIPTION OF PROJECTS 23

I. River Basins 25
- Housatonic 26
- Connecticut 27
- Pawcatuck 28
- Thames 29

II. Flood Damage Reduction 30

Dams and Reservoirs 31
- Black Rock Lake in Thomaston and Watertown 32
- Colebrook River Lake in Colebrook 32
- East Branch Dam in Torrington 33
- Hall Meadow Brook Dam in Torrington 33
- Hancock Brook Lake in Plymouth 34
- Hop Brook Lake in Naugatuck, Middlebury and Waterbury 35
- Mad River Lake in Winchester 36
- Mansfield Hollow Lake in Mansfield and Windham 36
- Northfield Brook Lake in Thomaston and Litchfield 37
- Sucker Brook Dam in Winchester 37
- Thomaston Dam in Thomaston 38
- West Thompson Lake in Thompson 38

Hurricane Protection Barriers 41
- New London 42
- Pawcatuck 42
- Stamford 43

Local Protection Projects 45
- Ansonia 46
- Byram River, Greenwich 46
- Danbury 46
- Derby 47
- East Hartford 47
- Folly Brook, Wethersfield 48
- Hartford 48
- North Canaan 49
- Norwalk 49
- Norwich 50
- Torrington – East Branch 50
- Torrington – West Branch 51
- Waterbury/Watertown 51
- Mad River, Waterbury (Woodtick) 52
- West River, New Haven 52
- Winsted 53

III. Navigation 54
- Navigation Projects in Connecticut 55
- Black Rock Harbor 56
- Branford Harbor 57
- Bridgeport Harbor 57
- Clinton Harbor 58
- Compo Beach 58
- Connecticut River 58
- Duck Island Harbor 60
- Fivemile River Harbor 60
- Greenwich Harbor 61
- Guilford Harbor 61
- Housatonic River 62
- Mianus River 62
- Milford Harbor 62
- Mystic River 62
- New Haven Harbor 63
- New London Harbor 64
- Niantic Bay and Harbor 65
- Norwalk Harbor 65
- Patchogue River 66
- Pawcatuck River and Little Narragansett Bay 66
- Port Chester Harbor 67
- Southport Harbor 67
- Stamford Harbor 68
- Stonington Harbor 68
- Stony Creek 68
- Thames River 68
- Westcott Cove 70
- Westport Harbor and Saugatuck River 71
- Wilson Point Harbor 71

IV. Shore and Bank Protection 72
- Shore and Bank Protection Projects in Connecticut 73
- Burial Hill Beach 74
- Calf Pasture Beach 74

Compo Beach 74
Cove Island 74
Cummings Park 74
Guilford Point Beach 75
Gulf Beach 75
Gulf Street 75
Hammonasset Beach 76
Housatonic River, Salisbury 76
Jennings Beach and Ash Creek 76
Lighthouse Point Park 76
Middle Beach 76
Connecticut River, Middletown 76
Nonewaug River, Woodbury 77
Port V Facility, Bridgeport 77
Prospect Beach 78
Salmon River, Colchester 78
Sasco Hill Beach 78
Sea Bluff Beach 78
Seaside Park 79
Sherwood Island State Park 79
Short Beach 79
Silver Beach to Cedar Beach 79
Farmington River, Simsbury 80
Southport Beach 80
Squantz Pond, New Fairfield 81
Woodmont Shore 81

C. STUDIES 84

Flood Damage Reduction 84
Housatonic River Basin 84
Long Island Sound 84
Rippowam River 84

Navigation 84
Stonington Harbor 84

Shore and Bank Protection 84
East Haven 84
Prospect Beach 84
Woodmont Beach 84

D. APPENDIX 85

I. Communities with Corps Projects 86

II. Glossary 90

III. Index 92

U.S. Army Corps of Engineers

Programs and Services

Civil Works Overview

Introduction

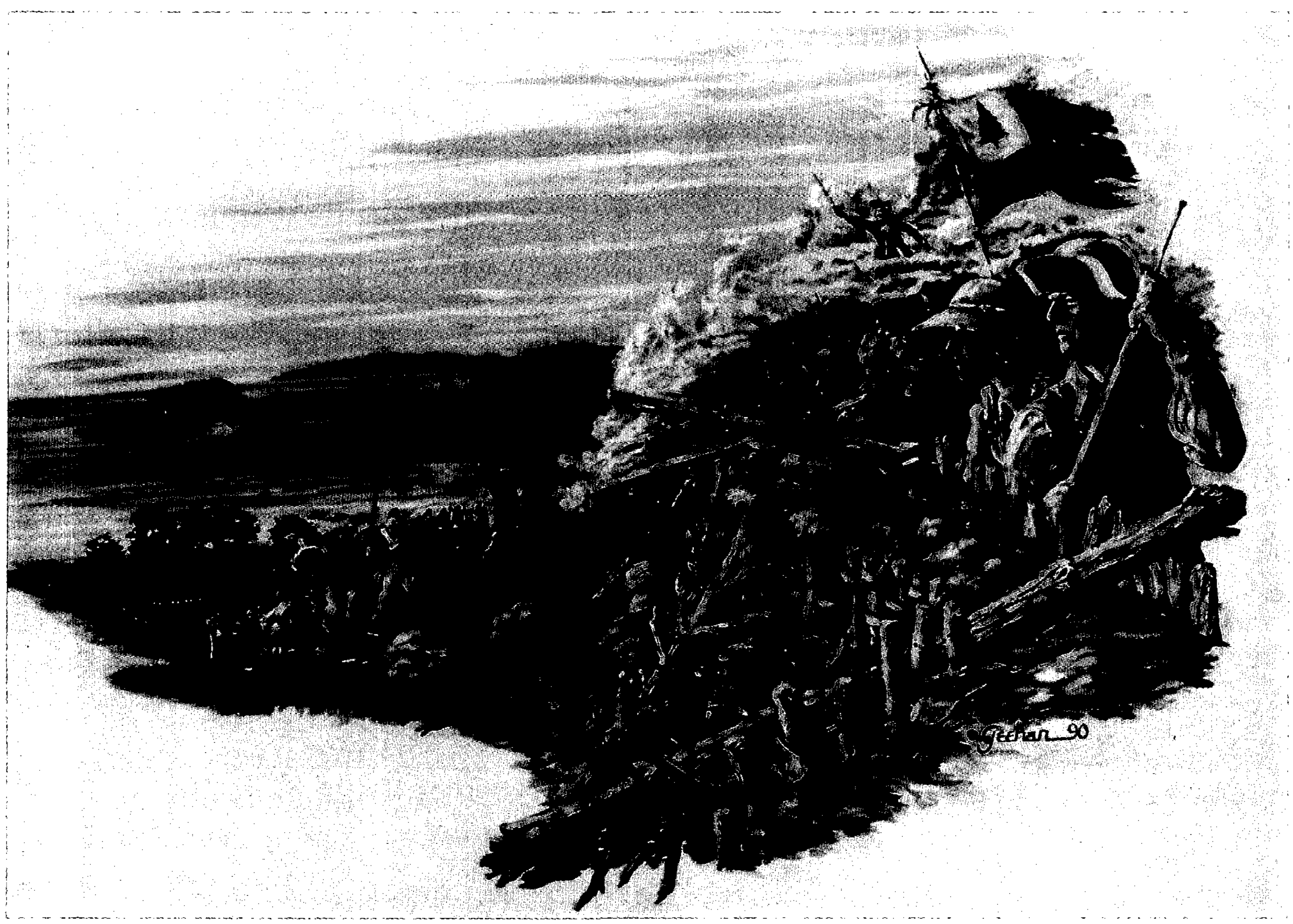
The Corps traces its history back to April 26, 1775, seven days after the first shots of the American Revolution were fired at Lexington, Massachusetts. Recognizing that the need for military engineering skill would be important in the war with England, the Massachusetts Provincial Congress appointed Boston native Richard Gridley to the rank of Colonel and chief engineer of the troops being raised in the colony.

In the early morning hours of June 17, 1775, Gridley, working under the cover of darkness, constructed a well-designed earthwork on Breed's Hill that proved practically invulnerable to British cannon. The British eventually took the hill (later called the Battle of Bunker Hill) when the patriots ran out of gunpowder, but at a cost in casualties greater than any other engagement of the war.

Gridley was to play other critical roles in the early days of the Revolution. On the evening of March 4, 1776, Gridley, along with 2000 men and 360 oxcarts loaded with entrenching materials, moved into Dorchester Heights. By daylight, two strong protective barriers looked down at the British. An astonished General Howe, commander of the British forces, reportedly remarked that the Americans had done more in one night than his entire army would have done in six months. Exposed to the American batteries on Dorchester Heights and not strong enough to fight Washington's troops in other parts of Boston, the British army and fleet departed Boston on March 17, never again to occupy Massachusetts.

In 1802, Congress established a separate Corps of Engineers within the Army, and at the same time established the U. S. Military Academy at West Point, the country's first—and for 20 years its only—engineering school. With the Army having the Nation's most readily available engineering talent, successive Congresses and Administrations established a role for the Corps as an organization to carry out both military construction and works "of a civil nature."

Throughout the nineteenth century, the Corps supervised the construction of coastal fortifications, lighthouses, several early railroads, and many of the public buildings in Washington, DC, and elsewhere. Meanwhile, the Corps of

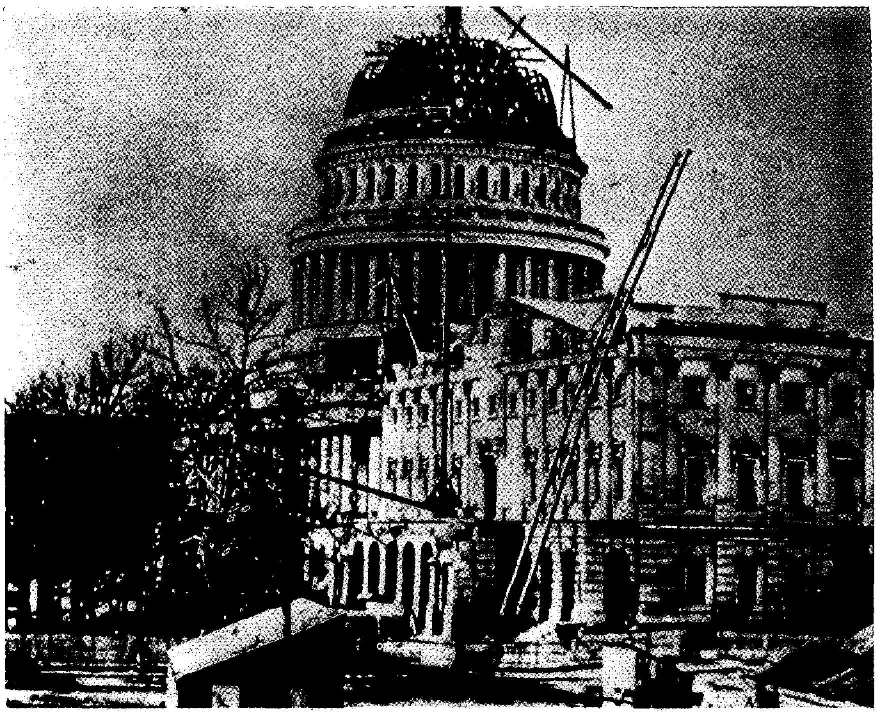


Under the direction of Colonel Richard Gridley, American patriots worked diligently throughout the early morning hours of June 17, 1775, designing a stout earthwork fortification that helped protect American soldiers from British cannonade in the historic Battle of Bunker Hill.

Topographical Engineers, which enjoyed a separate existence for 25 years (1838-1863), mapped much of the American West. Army Engineers served with distinction in war, with many Engineer officers rising to prominence during the Civil War.

In its civil role, the Corps of Engineers became increasingly involved with river and harbor improvements, carrying out its first harbor and jetty work in the first quarter of the nineteenth century. The Corps' ongoing responsibility for federal river and harbor improvements dates from 1824, when Congress passed two acts authorizing the Corps to survey roads and canals and to remove obstacles on the Ohio and Mississippi Rivers. Over the years since, the expertise gained by the Corps in navigation projects made it a natural to assume new water-related missions in such areas as flood control, shore and hurricane protection, hydropower, recreation, water supply and quality, and wetland protection.

Today's Corps of Engineers carries out missions in three broad areas: military construction and engineering support to military installations; reimbursible support to other Federal agencies (such as the Environmental Protection Agency's "Superfund" program to clean up hazardous and toxic waste sites); and the Civil Works mission, centered around navigation, flood control and—under the Water Resources Development Acts of 1986 and 1990 a growing role in environmental protection.



Army engineers contributed to both planning and construction of our nation's capital. When the Capitol Building had to be reconstructed in 1857, the Corps built two new wings and redesigned the dome with cast and wrought iron. The completed dome, which weighed almost nine million pounds, was used by President Abraham Lincoln during the Civil War as a symbol of his intention to preserve the Union.

Cleaning chemical spills at hazardous waste sites is a team project between the Corps and the EPA. An area identified as a hazardous waste location was this site in Dartmouth, Massachusetts, near Cornell Pond and the Copicut River.

Authorization and Planning Process for Water Resources Projects

Water resources activities are initiated by local interests, authorized by Congress, funded by Federal and non-Federal sources, and constructed by the Corps under the Civil Works Program. New England Division has water resource responsibilities in all six New England states. The area assigned to New England Division contains 66,000 square miles, 13 million people, 6,100 miles of coastline, 13 major river basins and 11 deep draft commercial ports.

The Water Resources Development Act of 1986 made numerous changes in the way potential new water resources projects are studied, evaluated and funded. The major change is that the law now specifies non-Federal cost sharing for most Corps water resources projects.

When local interests feel that a need exists for improved navigation, flood protection, or other water resources development, they may petition their representatives in Congress. A Congressional committee resolution or an Act of Congress may then authorize the Corps of Engineers to investigate the problems and submit a report. Water resources studies, except studies of the inland waterway navigation system, are conducted in partnership with a local sponsor, with the Corps and the sponsor jointly funding and managing the study.

For inland navigation and waterway projects, which are by their nature not "local," Congress has established, in the Water Resources Development Act of 1986, an Inland Waterway Users Board, comprised of waterway transportation companies and shippers of major commodities. This Board advises the Secretary of the Army and makes recommendations on priorities for new navigation projects (e.g., locks and dams, channel improvements, etc.). Such projects are funded in part from the Inland Waterway Trust Fund, which in turn is fed by waterway fuel taxes.

Normally, the study process for a water resource problem will include public meetings to determine the views of local interests on the extent and type of improvements desired. The desires of local interests and the views of Federal, State, and other agencies receive full consideration during the planning process.

Considerations which enter into recommendations to Congress for project authorization include determinations that benefits will exceed costs, and that the engineering design of the project is sound, best serves the needs of the people concerned, makes the wisest possible use of the natural resources involved, and adequately protects the environment.

A report, along with final environmental documentation, is then submitted to higher authority for review and recommendations. After review and coordination with all interested Federal agencies and Governors of affected States, the Chief of Engineers forwards the report and environmental statement to the Secretary of the Army, who obtains the views of the Office of Management and Budget before transmitting these documents to Congress.

If Congress includes the project in an authorization bill, enactment of the bill constitutes authorization of the project. Before construction can get underway, however, both the Federal government and the local project sponsor must provide funds. Budget recommendations are based on evidence of support by the State and by the ability and willingness of non-Federal sponsors to provide their share of the project cost.

Appropriation of money to build a particular project is usually included in the annual Energy and Water Development Appropriation Bill, which must be approved by both Houses of the Congress and the President.

Navigation

Rivers and waterways were the primary paths of commerce in the new country. They provided routes from western farms to eastern markets. They promised a new life to the seaboard emigre and financial reward for the Mississippi Valley merchant. Without its great rivers, the vast, thickly-forested, region west of the Appalachians would have remained impenetrable to all but the most resourceful early pioneers.

Consequently, western politicians such as Henry Clay agitated for federal assistance to improve rivers. At the same time, the War of 1812 showed the importance of a reliable inland navigation system to national defense. Thus, both commercial development and military needs required attention to river and harbor development. There was, however, a question as to whether transportation was, under the Constitution, a legitimate Federal activity. This question was resolved when the Supreme Court ruled that the Commerce Clause of the Constitution granted the Federal Government the authority not only to regulate navigation and commerce, but also to make necessary navigation improvements.

The system of harbors and waterways maintained by the Corps of Engineers remains one of the most important parts of the Nation's transportation system. Without constant supervision, rivers and other waterways collect soil, debris and other obstacles, which lead to groundings and wrecks. New channels and cutoffs appear frequently, and the main traffic lanes require continual surveillance.

Where authorized to do so, the Corps maintains the Nation's waterways as a safe, reliable and economically efficient navigation system. Inland waterways carry one sixth of the Nation's inter-city cargo, and one job in five in the United States is dependent, to some extent, on the commerce handled by the Nation's ports.

River and Harbor work by the Corps of Engineers in New England was initiated by a congressional appropria-

Jetties help provide safe channels for commercial and recreational vessels. The jetties at Saquatucket Harbor in Harwich, Massachusetts, also help prevent the buildup of sediment in the channel by directing and confining the tidal flow.

tion of $20,000 on May 26, 1824 "to repair Plymouth Beach, in the State of Massachusetts, and thereby prevent the harbour at that place from being destroyed." From that initial project at America's first permanent settlement, New England Division has completed 173 navigation projects , including federal navigation projects in 11 deep draft ports and adjacent waterways. The most visible of The Corps navigation responsibilities is the Cape Cod Canal, which has been operated by the federal government since 1928. The canal is 17.5 miles long and is traversed by 19,000 vessels annually. In addition, its recreation features attract over 4 million annual visitors to the project.

Flood Control and Flood Plain Management

Federal interest in flood control began in the Alluvial Valley of the Mississippi River in the 19th Century. As the relationship of flood control and navigation became apparent, Congress called on the Corps of Engineers to use its expertise in navigational work to devise solutions to flooding problems along the river.

After a series of disastrous floods affecting wide areas, including transportation systems, in the 1920's and 30's, it was recognized that the Federal Government should participate in the solution of problems affecting the public interest when they are too large or complex to be handled by States or localities. As a result, Corps authority for flood control work was extended in 1936 to embrace the entire country.

The purpose of flood control work is to prevent flood damage through flood flow regulation and other means. In addition, the Flood Control Act of 1944 provided that "flood control" shall include major drainage of land. These objectives are accomplished with structural measures, such as reservoirs, levees, channels and floodwalls, or non-structural measures which alter the way people would otherwise occupy or use the flood plain. Levees, channel improvements and flood walls built for flood control by the Corps of Engineers are turned over to non-Federal authorities for operation and maintenance.

Reservoirs constructed for flood control storage often include additional storage capacity for multiple-purpose uses, such as the storage of water for municipal and industrial use, navigation, irrigation, development of hydroelectric power, conservation of fish and wildlife, and recreation.

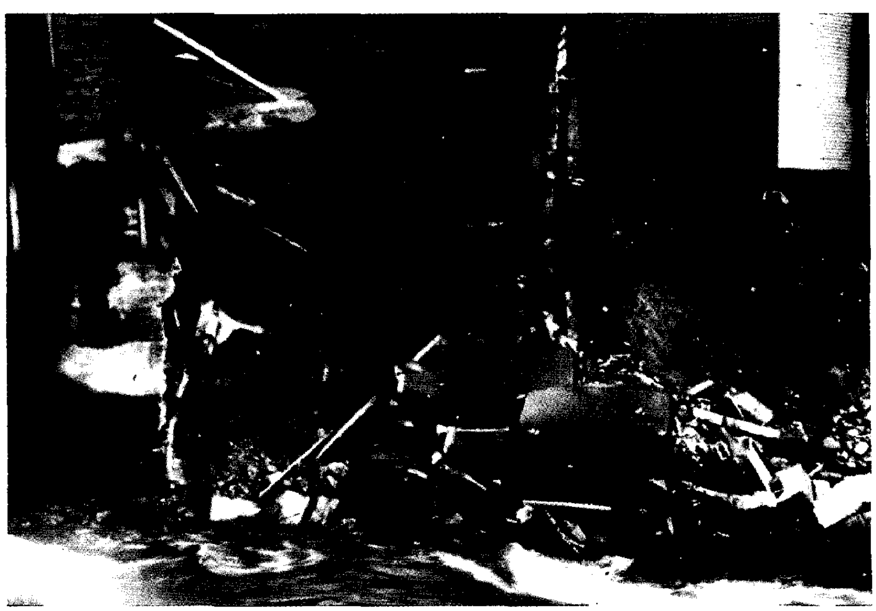
The Corps fights the Nation's flood problems by not only constructing and maintaining flood control structures, but also by providing detailed technical information on flood hazards. Under the Flood Plain Management Services Program, the Corps provides, on request, flood hazard information, technical assistance and planning guidance to other Federal agencies, States, local governments and private individuals. This information is designed to aid in planning for floods and regulation of flood plain areas, thus avoiding unwise development in flood-prone areas. Once community officials know the flood- prone areas in their communities and how often floods would be likely to occur, they can take necessary action to prevent or minimize damages to existing and new buildings and facilities by adopting and enforcing zoning ordinances, building codes and subdivision regulations. The Flood Plain Management Services Program also provides assistance to other Federal agencies and to State agencies in the same manner. In many cases, fees are collected to cover a portion of the costs of these services.

Flooding in New England

New England has a long history of flooding. Through the years it has been hit with various storms that have caused millions of dollars in damages. Some of the more destructive hurricanes and floods the area has experienced since 1900 occurred in November 1927; March 1936; September 1938; September 1954; and August 1955. However, some of the highest flood levels in New England history occurred in April 1987 and gave many Corps dams their most serious test since they were built. Despite having six dams channel excess water through their emergency spillways because their reservoir capacities had been reached, the 35 dams under the jurisdiction of the Corps' New England Division held back billions of gallons of water that otherwise would have caused severe flooding downstream. The amount of water held back by these dams from this heavy rainfall was equivalent to a reservoir that could put the entire state of Rhode Island under more than one foot of water. Damages prevented by Corps flood control projects during the April 1987 storm amounted to $462.6 million.

1927

Floodwaters swirl around homes and trees in this Vermont community during the November 1927 flood. The storm claimed 21 lives and caused $29.3 million in property damage.



1936

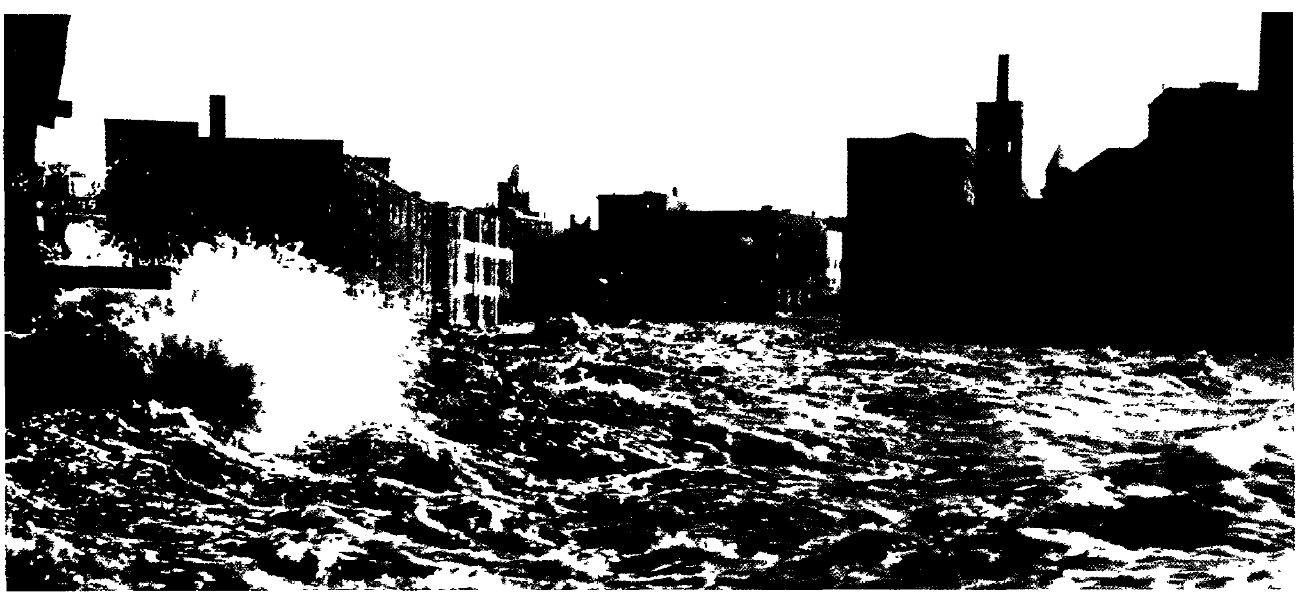
The rampaging waters of the North Nashua River ripped through the downtown area of Fitchburg, Massachusetts, during the March 1936 flood, taking with it homes, automobiles, and commercial and industrial property. Eleven lives were lost from this flood and damages were estimated at $66.4 million.

1936 *Waters from the Connecticut River surround the Hartford South Meadows Power Station (center) and cover much of Hartford, Connecticut, during the March 1936 flood. The spring floods of 1936 brought widespread disaster from Maine to Maryland and helped mold political and public opinion that culminated in the Flood Control Act of 1936, which recognized the proper involvement of the federal government in flood control. (Copyright 1936* The Hartford Courant*).*

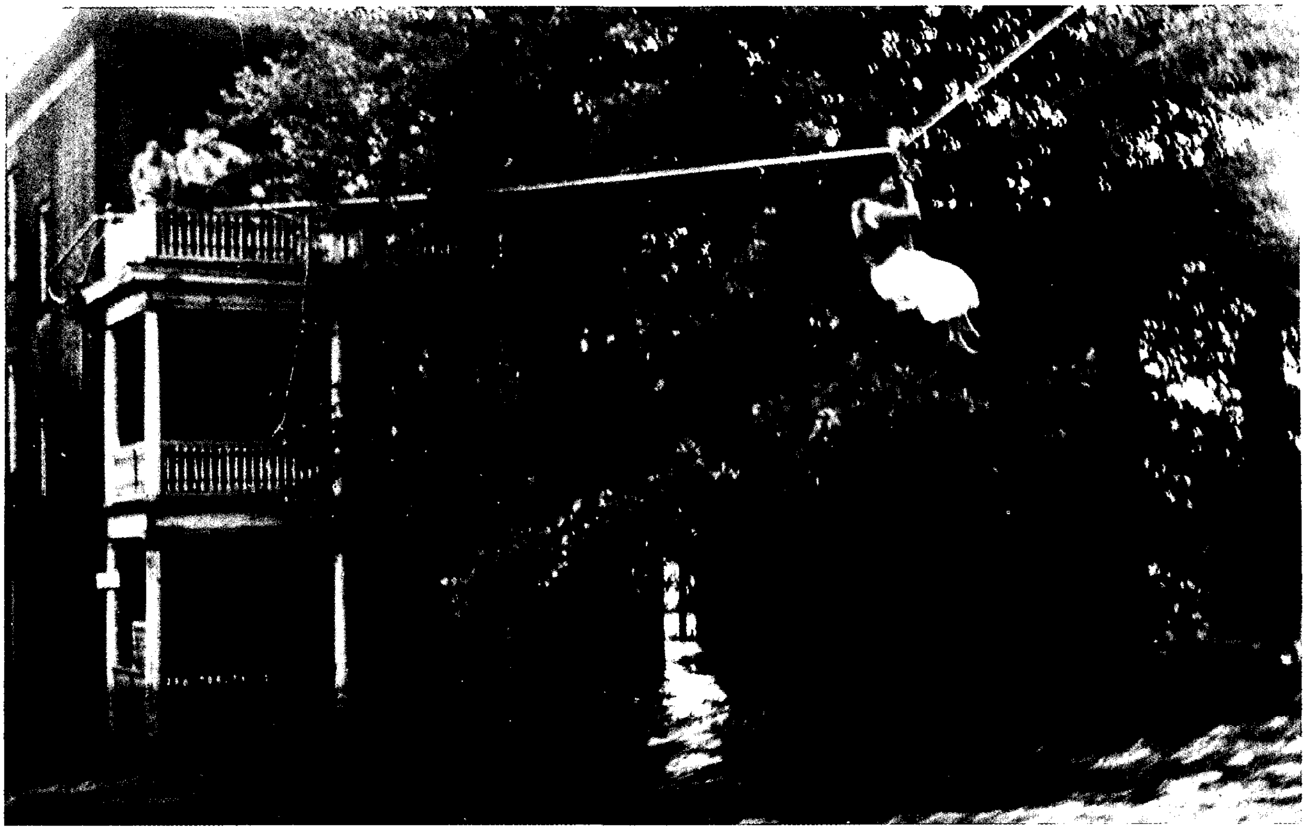
1938

The heavy rains of the September 1938 hurricane caused the Contoocook River to flood a section of East Jaffrey, New Hampshire. This storm, with its 121 m.p.h. gusts, took the lives of eight people in New England and caused damages of $48.6 million (about $740 million in today's dollars).

1954 *Hurricane Carol, which struck the New England coast in August 1954, caused damages estimated at $186 million ($685 million in today's dollars). The storm achieved its greatest fury in a band stretching from New London, Connecticut to the Cape Cod Canal. All that remains of the Rhode Island Yacht Club (above) in the Pawtuxet Neck section of Warwick, Rhode Island, is a cradle of piles after the structure was destroyed by Carol's high winds and waves. (Copyright 1954* The Providence Journal Company*)*



1955 *The Blackstone River overflows its banks and floods several businesses and homes in Pawtucket, Rhode Island as a result of the heavy rains of Hurricane Diane in August 1955.*



1955

No natural disaster in New England history compares with the devastation caused by the sudden and torrential rainfall which accompanied Hurricane Diane in August 1955. The disaster killed 90 people and caused almost $458 million (about $1.82 billion in today's dollars) in property damage throughout the six-state region. In Connecticut alone, Diane's floodwaters killed 47 people and caused damages totalling about $370 million (about $1.3 billion in today's dollars). The rains of Hurricane Diane fell on ground already saturated by the rains of Hurricane Connie one week earlier.

One of the communities that sustained heavy damage was Winsted, Connecticut. The waters of the Mad River overflowed its banks and roared through Main Street, uprooting foundations and flooding homes and businesses. When the floodwaters receded, the devastation became apparent (right). Main Street had become a pile of rubble, cluttered with debris ripped from its understructure.

The storm also forced hundreds of New Englanders to evacuate their homes, including a Connecticut woman (above) who was dramatically rescued from ravaging floodwaters. (Copyright 1955 The Hartford Courant*).*

Only two months later, as Connecticut was getting back on its feet, another severe flood disrupted rehabilitation measures and caused losses estimated at $6.5 million. In response to these major floods, the Corps built several dams and local protection projects that, in a recurrence of the August 1955 flood today, would prevent damages of $1.04 billion

1955 *As these photos from August 1955 demonstrate, floodwaters pose a powerful threat to property and lives. As the top photo shows, this Southbridge, Massachusetts home was toppled when the floodwaters of the Quinebaug River weakened its foundation. Note the overturned automobile on the left; its only identifiable remains are its tires.*

Floodwaters from the Blackstone River (above) roar through Webster Square in Worcester, Massachusetts.

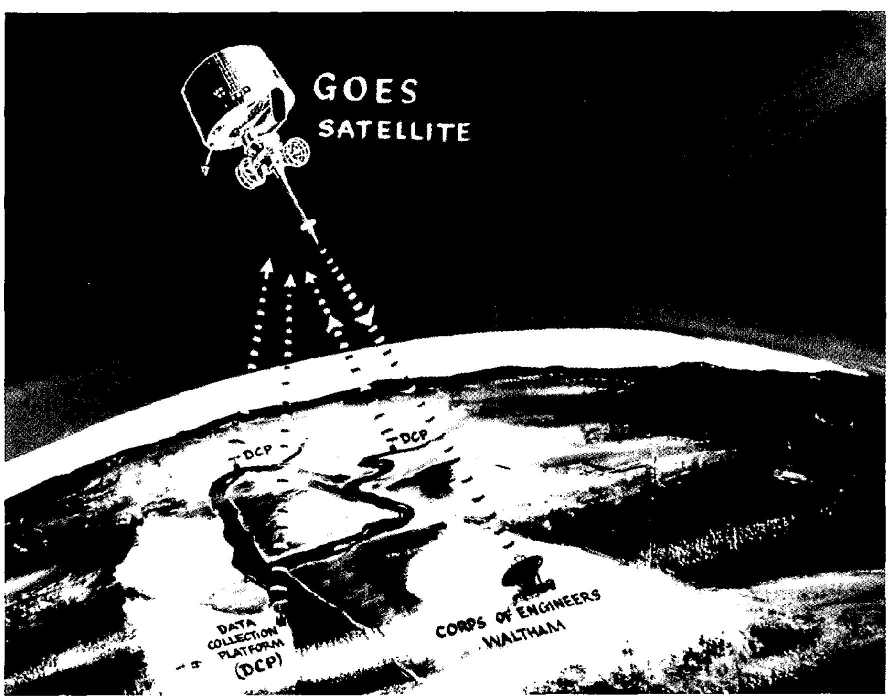
Reservoir Control Center

As a flood situation develops, considerable judgment and experience are required to efficiently manage Corps dams and reservoirs. Weather conditions, reservoir storage capacity, and the flood levels of rivers are important factors when operating dams that maximize the protection of downstream communities and minimize flood damage. The nature of New England weather requires the region's dams and reservoirs be professionally managed by trained engineers and hydrologists. These skilled technicians, using sophisticated communications equipment, form an integral part of the Corps' flood control efforts known as the Reservoir Control Center (RCC).

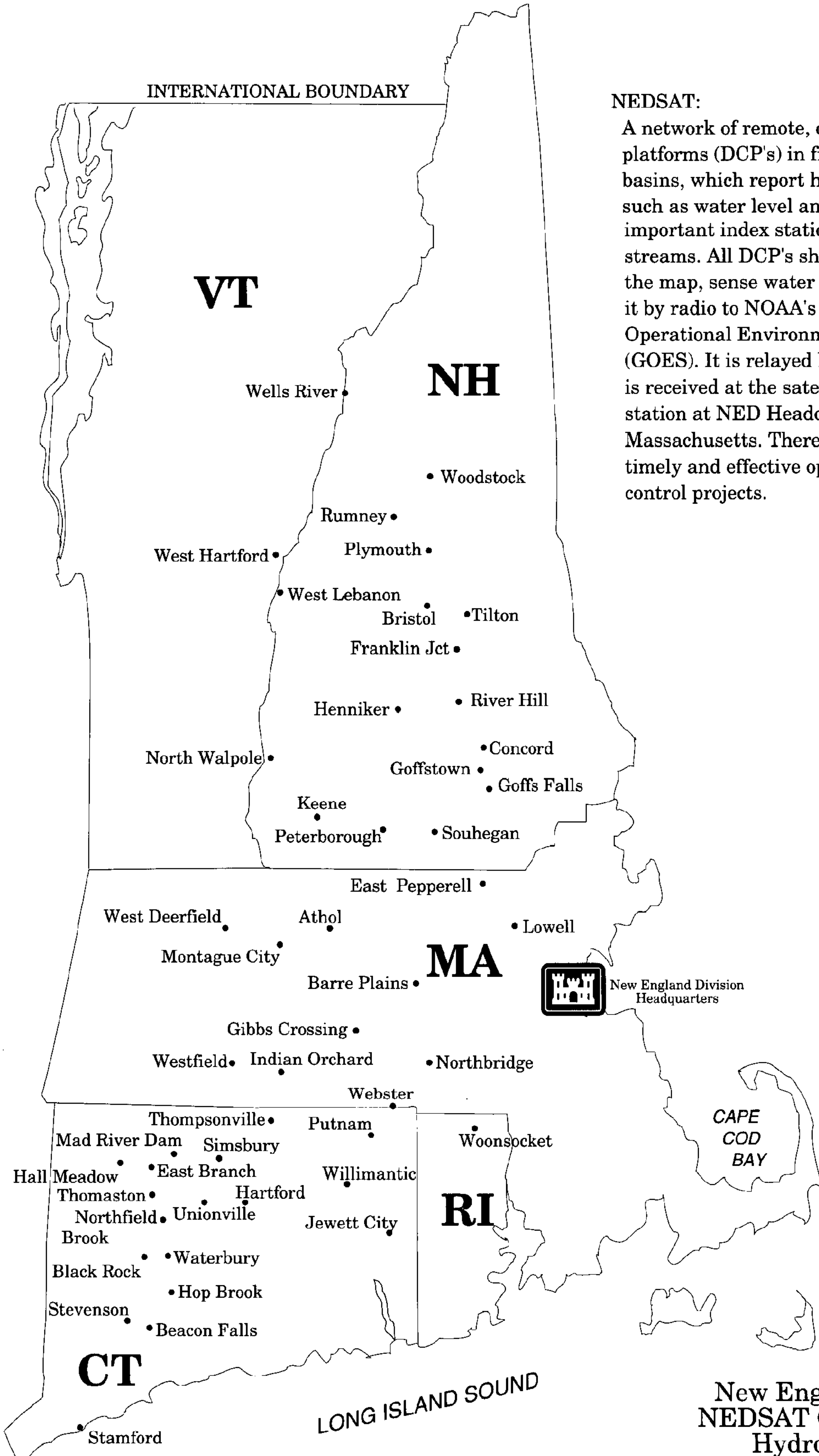
The RCC is located at the Corps' New England headquarters in Waltham, Massachusetts. From this site, Corps engineers closely monitor precipitation, river levels, and tidal levels in New England. The state-of-the-art communications equipment used by RCC personnel is complemented by the Geostationary Operational Environmental Satellite (GOES) System. The GOES system serves as a communication link for the relay of hydrologic and meteorological data. Information from about 50 data collection platforms at key locations along rivers, streams and other bodies of water is relayed to a stationary satellite, which transmits this data by radio signal to the RCC. Engineers then examine and analyze this hydrologic information for potential flood conditions. This data indicates when to operate the flood control gates and when to release stored floodwaters from reservoirs once downstream flood conditions have receded. During flood emergency periods, additional information is obtained by telephone, teletype, and radio from field personnel and other agencies, such as the National Weather Service and the U.S. Geological Survey.

The Reservoir Control Center has helped minimize or prevent severe and damaging floods in many New England communities. The Corps is proud of its commitment to provide the public with improved flood protection through the professional management of its dams and hurricane protection barriers.

New England Division has been an innovative leader in the use of non-structural solutions for flooding problems. The Charles River Natural Valley Storage Project provides a novel approach to flood protection in parts of Boston and Cambridge by retaining flood flows on 8,100 acres of wetland areas aquired by the government at a cost of $9 million. In Warwick, Rhode Island flood-prone properties were aquired, removed or modified to withstand high water events with the federal government underwriting 80% of the cost. In these times of environmental concern and building restrictions, non-structural flood protection projects have the potential to protect life and property with minimal adverse environmental impacts.



The GOES network, or the New England Division Satellite System (NEDSAT), plays a key role in helping the Corps reduce flood damage. About 50 data collection platforms (DCPs) are situated on various rivers and streams throughout the five New England states (opposite page) where the Corps has dams and hurricane protection barriers. Hydrologic and meteorological data from these DCPs are relayed to a satellite stationed above the earth (right). The satellite then transmits this information by radio signal to the Corps' Reservoir Control Center in Waltham, Massachusetts. The data tell Corps' engineers when to open or close the floodgates of Corps' dams and hurricane protection barriers, thus limiting damage to communities downstream. The GOES system also provides the national weather maps displayed by local TV weathermen during their forecasts.



NEDSAT:
A network of remote, data collection platforms (DCP's) in five major river basins, which report hydrologic data, such as water level and rainfall, from important index stations on rivers and streams. All DCP's show by dots on the map, sense water data and transmit it by radio to NOAA's Geostationary Operational Environmental Satellite (GOES). It is relayed back to Earth, and is received at the satellite ground station at NED Headquarters in Waltham, Massachusetts. There it is used for timely and effective operation of flood control projects.

New England Division
NEDSAT GOES Satellite
Hydrologic Data
Collection Network

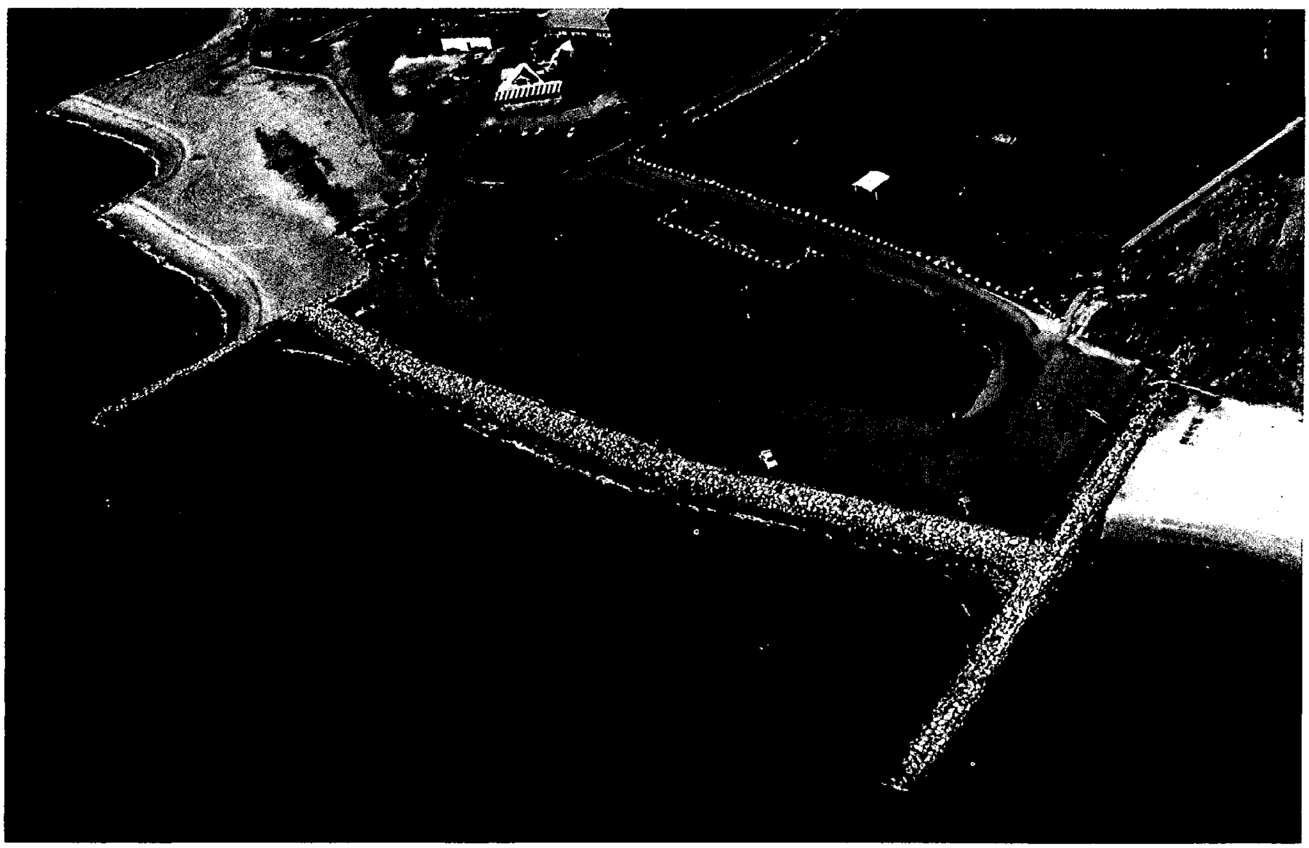
Shore and Hurricane Protection

The Corps work in shore protection began in 1930, when Congress directed it to study ways to reduce erosion along U.S. seacoasts and the Great Lakes. Corps of Engineers hurricane protection work began in 1955, when Congress directed it to conduct general investigations along the Atlantic and Gulf Coasts to identify problem areas and determine the feasibility of protection.

While each situation the Corps studies requires different considerations, engineers look at each one with structural and non-structural solutions in mind. Engineering feasibility and economic efficiency are considered along with the environmental and social impacts. A recommendation for Federal participation is normally based on shore ownership, use and type and frequency of benefits if there is no public use or benefit, Federal participation is not recommended. Once a shore protection project is completed, non-Federal interests assume responsibility for its operation and maintenance. The New England Division has completed 36 streambank/shoreline protection projects in the region.

New England Division has been a pioneer in the construction of hurricane protection barriers. NED has constructed and operates hurricane barriers in Stamford, CT and New Bedford, MA. Additionally NED has constructed barriers in Providence, R.I.; Pawcatuck, CT; and New London, CT. The local communities have assumed responsibility for their operation and maintenance.

Section 145 of the Water Resources Development Act of 1976 authorizes placement of beach quality sand from our dredging projects on adjacent beaches with local interests picking up the additional costs of the disposal. Section 933 of the Water Resources Development Act of 1986 reduces this local cost share from 100 to 50 percent of additional costs.



This shore protection project at Oakland Beach in Warwick, Rhode Island, is a good example of how Corps' works help protect shores and restore beaches. Sand replenishment, which widened and restored the two beach areas on the far left and far right, slows the ocean's inland advance. The four groins maintain shore alignment by trapping and retaining sand. The stone revetment, in the center of the photograph between two groins, retards erosion.

Hydropower

The Corps has played a significant role in meeting the Nation's electric power generation needs by building and operating hydropower plants in connection with its large multiple-purpose dams. The Corps' involvement in hydropower generation began with the Rivers and Harbors Acts of 1890 and 1899, which required the Secretary of War and the Corps of Engineers to approve the sites and plans for all dams and to issue permits for their construction. The Rivers and Harbors Act of 1909 directed the Corps to consider various water uses, including water power, when submitting preliminary reports on potential projects.

The Corps continues to consider the potential for hydroelectric power development during the planning process for all water resources projects involving dams and reservoirs. In most instances, hydropower facilities at Corps projects are now developed by non-Federal interests without Federal assistance, but the Corps becomes involved with the planning, construction and operation of hydropower projects when it is impractical for non-Federal interests to do so. Today, the more than 20,000 megawatts of capacity at corps-operated power plants provide approximately 30 percent of the Nation's hydroelectric power, or 3.5 percent of its total electric energy supply.

In New England, the Corps does not operate any hydroelectric power facilities, but there are eight hydroelectric power plants at Corps flood control dams which are owned and operated by nonfederal interests. These plants are located in:

- *North Hartland, Vermont,* about 500 feet downstream of the North Hartland Lake Dam. This facility produces 4 megawatts of power. All power generated at this plant is used by the Vermont Electric Cooperative or is sold to other utilities.
- *Quechee, Vermont,* 2.5 miles upstream of the North Hartland Lake Dam and within the reservoir area. Built on Corps land, this plant produces 1.8 megawatts. Power is sold to the Central Vermont Public Service Corporation.
- *Waterbury, Vermont,* at the base of the dam at Waterbury Reservoir. This facility generates approximately 5.5 megawatts of power, which is used by the Green Mountain Power Corporation.
- *Montpelier, Vermont,* approximately 200 feet downstream of the dam at Wrightsville Reservoir. The plant has the capacity to produce 1.2 kilowatts of power, which is used by the Washington Electric Cooperative.
- *Franklin, New Hampshire,* on Salmon Brook. Built on Corps land within the Franklin Falls reservoir, this facility produces 0.2 megawatts of power. Power is sold to the Public Service Company of New Hampshire.
- *Bristol, New Hampshire,* on the Newfound River. This plant produces 1.5 megawatts and lies on private property but within the Franklin Falls reservoir area. Power is sold to the Public Service Company of New Hampshire.
- *Peterborough, New Hampshire,* on Verney Mills Dam at Edward MacDowell Lake. This facility began producing power in 1990. The power is sold to the Public Service Company of New Hampshire.

Although the Corps does not presently operate any hydroelectric power plants in New England, there are five hydropower plants located at Corps flood control projects in the region that are owned and operated by nonfederal interests. The North Hartland hydropower facility in North Hartland, Vermont, located 500 feet downstream of the Corps-operated North Hartland Lake Dam, is one such facility.

- *Colebrook, Connecticut,* at the intake of the dam at Colebrook River Lake. This facility began producing power in 1989. The 3.3 megawatts of power is sold to the Connecticut Light and Power Company.

New England Division is evaluating a prototype design for installation of a vertical axis hydro turbine (VAHT) which would harness the energies of the continual tidal currents at the Cape Cod Canal. If installed, the energy generated would offset the current electrical bill. This prototype has widespread repercussions as it does not require the costly superstructure of conventional submerged hydro turbines.

Water Supply

The Water Supply Act of 1958 authorized the Corps to provide additional storage in its reservoirs for municipal and industrial water supply at the request of local interests, provided those interests agree to pay the cost. For irrigation, the Flood Control Act of 1944 provided that the Secretary of War, upon the recommendation of the Secretary of the Interior, may utilize Corps reservoirs, provided that water users agree to repay the Government for the water in accordance with the 1902 Reclamation Law, as amended. Both Littleville and Colebrook Lakes have been designed to provide backup water supplies to surrounding communities in times of severe droughts. Littleville Lake will serve communities in the Springfield, MA area, while Colebrook Lake will serve communities in Northwestern Connecticut.

Reservoir capacity can also be used for water quality and streamflow regulation, as authorized by the Federal Water Pollution Control Act Amendments of 1961.

Environmental Quality

In conducting its Civil Works Programs, the Corps must comply with many environmental laws and executive orders and numerous regulations relating to the environment. Consideration of the environmental impact of a Corps project begins in the early stages and continues through design, construction and operation of the project. The Corps must also comply with many of these environmental regulations in conducting its regulatory programs *(see next section)*.

The National Environmental Policy Act (NEPA) of 1969 is the national charter for the protection of the environment, and its procedures ensure that public officials and private citizens may obtain and provide environmental information before Federal agencies make decisions concerning the environment. Corps of Engineers project planning procedures under NEPA often point out the need for more extensive environmental studies, namely the preparation of environmental impact statements. In selecting alternative project designs, the Corps strives to choose options with minimum environmental impact.

Under Section 1135 of the Water Resources Development Act of 1986, the Corps is authorized to modify its existing projects—many of them built before current environmental requirements were in effect for environmental improvement. Proposed modifications under this authority range from use of dredged material to create nesting sites for waterfowl to modification of water control structures to improve downstream water quality for fisheries. Several of these proposals were specifically designed to help meet the goals of the North American Waterfowl Management Plan. The Corps is working to select additional projects for modification.

A beaver pipe allows water to pass underneath a beaver dam, preventing the flooding of nearby roads and controlling the water level. This beaver pipe was constructed and installed at Surry Mountain Lake Dam in Surry, New Hampshire.

Regulatory Programs

The Corps of Engineers has regulatory authority over any construction or other work in navigable waterways under Section 10 of the Rivers and Harbors Act of 1899, and authority over the discharge of dredged or fill material into the "waters of the United States" a term which includes wetlands and all other aquatic areas under Section 404 of the Federal Water Pollution Control Act Amendments of 1972 (PL 92-500, the "Clean Water Act").

The Corps regulatory program is the principal way by which the Federal government protects wetlands and other aquatic environments and ensures the continued navigability of the Nation's waterways. The regulatory program's goal is to ensure protection of the aquatic environment while allowing for environmentally sustainable development.

The standard permit evaluation process includes a public notice with a public comment period and an opportunity for a public hearing before the Corps makes a permit decision. In its evaluation of permit applications, the Corps considers all the relevant factors, including conservation, economics, aesthetics, general environmental concerns, historical values, wetland values, fish and wildlife values, flood damage prevention, land use classifications, navigation, recreation, water supply, water quality, energy needs, food production and the general welfare of the public.

The Corps of Engineers has issued a number of nationwide general permits for minor activities which require little or no individual review. Individual Corps districts have also issued regional permits for certain types of minor work in specific areas. Corps districts have also issued State Program General Permits in States with comprehensive wetland protection programs. These permits allow applicants to do work for which a State permit has been issued. These general permits reduce delays and paperwork for applicants and allow the Corps to devote its resources to the most significant cases while maintaining the environmental safeguards of the Clean Water Act.

Baker Cove in Groton, Connecticut, like many wetlands, supports numerous plant and animal species. Before building a proposed project in a given area, the Corps looks closely at the effects such a project may have on the environment and surrounding wetlands. The Corps considers all options, including those that preclude development, in finding a solution to a water resources problem.

Recreation

The Flood Control Act of 1944, as amended, provides authority to construct, maintain, and operate public park and recreational facilities at water resources development projects under the control of the Secretary of the Army and to permit the construction, maintenance, and operation of such facilities. It also provides that the water areas of projects shall be open to public use - generally for boating, fishing, and other recreational purposes. The Corps of Engineers today is one of the Federal government's largest providers of outdoor recreational opportunities, operating more than 2,000 sites at its lakes and other water resource projects, and receiving more than 600 million visits per year.

The recreation opportunities attract 7.9 million visitors to New England Division projects per year. Of these, 3.9 million visitors utilize the flood control projects, while 4.0 million take advantage of various facilities of the Cape Cod Canal.

There are many recreational opportunities available at the 35 dams and reservoirs built by the Corps' New England Division such as snowmobiling at Blackwater Dam in Webster, New Hampshire (right); and fly fishing at Townshend Lake Dam in Townshend, Vermont (below).

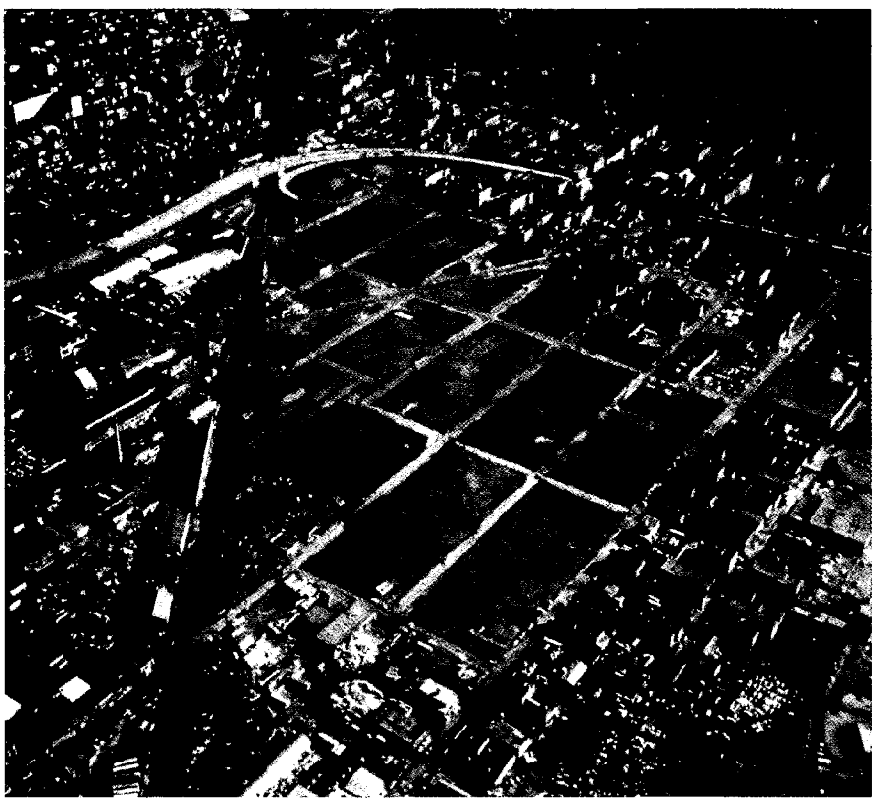
Emergency Response and Recovery

Corps assistance for emergency/disaster response and recovery is provided under Public Law 84-99, covering Flood Control and Coastal Emergencies, or in support of other agencies, particularly the Federal Emergency Management Agency (FEMA) under Public Law 93-288 (the Stafford Act), as amended.

Under PL 84-99 the Chief of Engineers, acting for the Secretary of the Army, is authorized to undertake activities including disaster preparedness, advance measures, emergency operations (e.g., flood fighting, rescue and emergency relief activities), rehabilitation of flood control works threatened or destroyed by flood, protection or repair of Federally authorized shore protection works threatened or damaged by coastal storms, and providing emergency supplies of clean water in cases of drought or contaminated water supply. In post-flood response activities, the Corps provides temporary construction and repairs to essential public utilities and facilities and emergency access for a 10-day period, at the request of the Governor.

Under the Stafford Act and the Federal Disaster Response Plan, the Corps of Engineers has a standing mission assignment to provide public works and engineering support in response to a major disaster or catastrophic earthquake. Under this Plan, the Corps will work directly with the State in providing temporary repair and construction of roads, bridges, and utilities, temporary shelter, debris removal and demolition, water supply, etc.

In addition to its mission under the federal Disaster Response Plan, the Corps is one of the Federal agencies tasked by FEMA to provide engineering, design, construction and contract management in support of recovery operations.



The Corps provided disaster relief assistance to residents of Chelsea, Massachusetts, when fire destroyed 18 city blocks in October 1973.

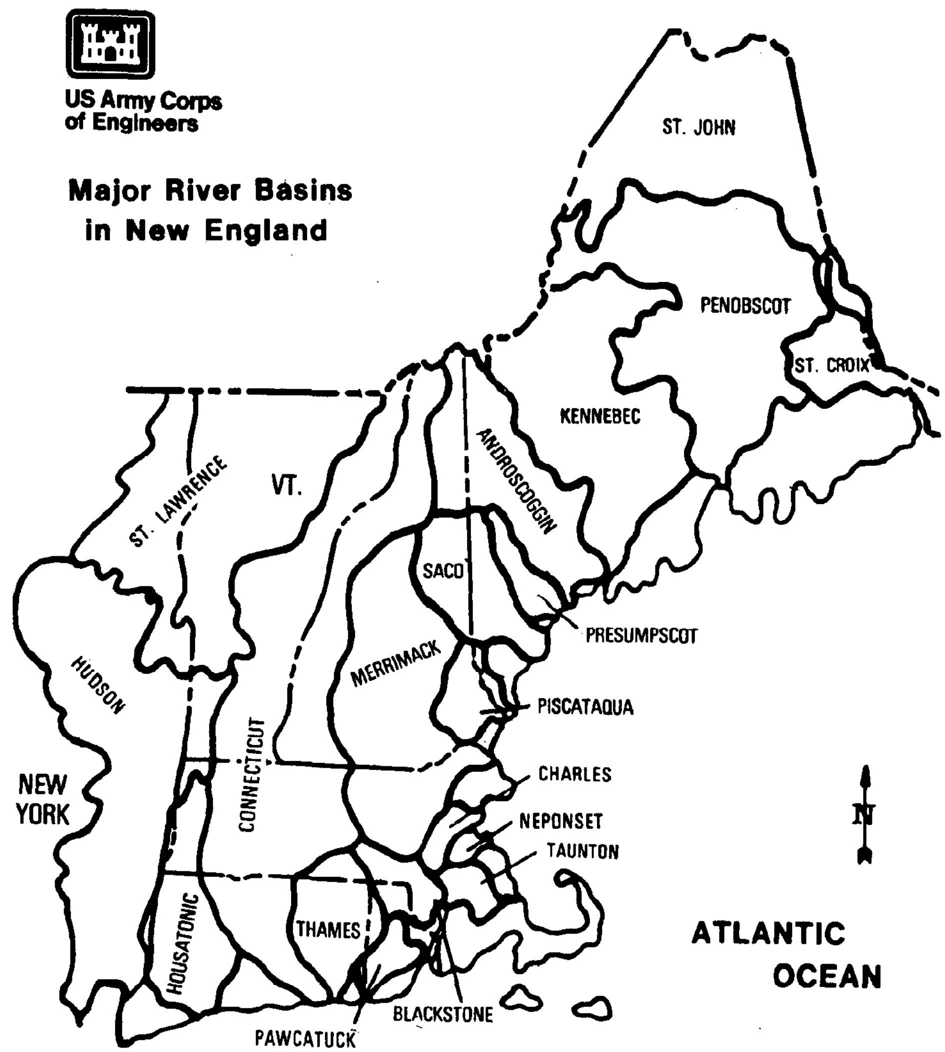
DESCRIPTION OF PROJECTS

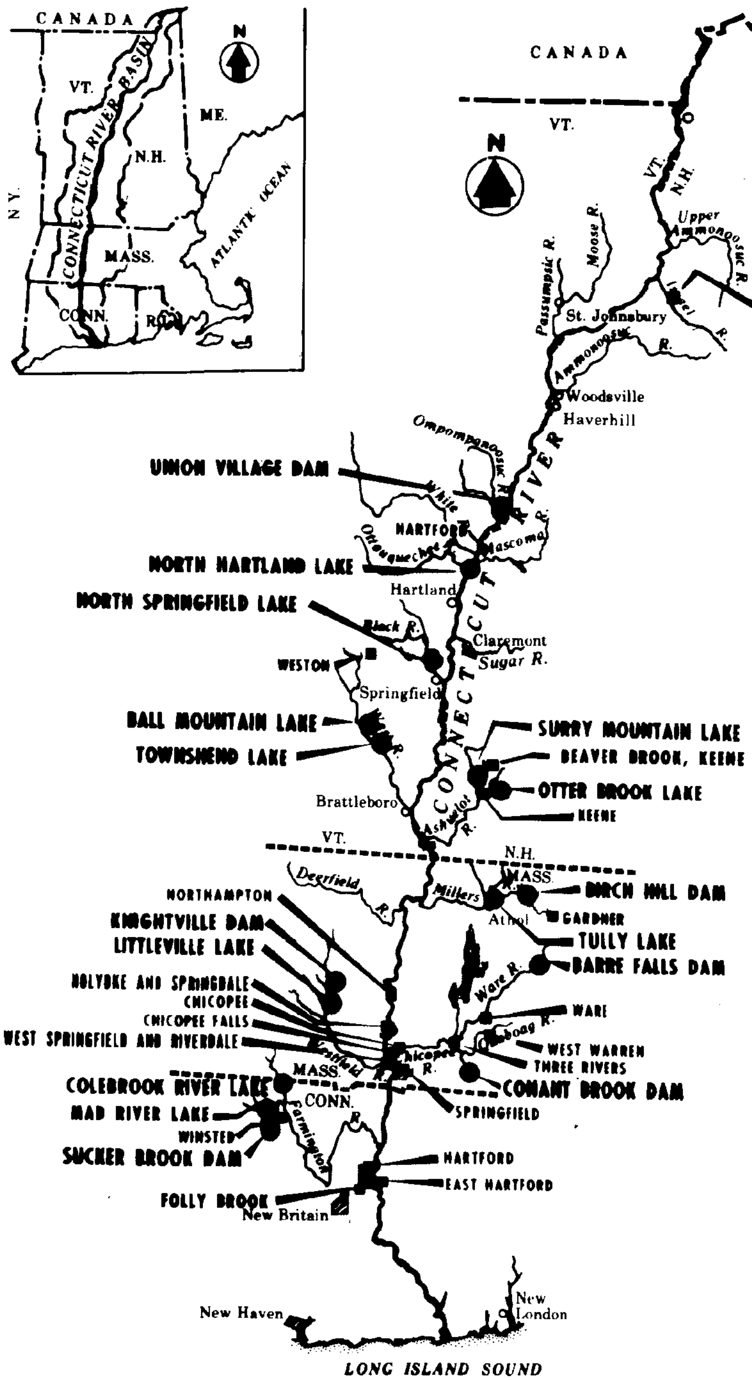
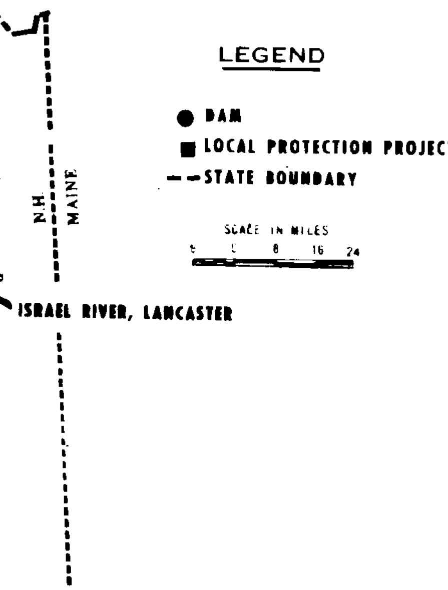
River Basins

Flooding is caused by a combination of many factors related to the underlying river basin. Corps' Flood Damage Reduction projects, such as dams and Local Protection Projects, are designed and constructed as part of an overall plan to limit flooding in a particular river basin.

There are 19 principal river basins that lie entirely or partially in New England. Of this number, five lie in parts of Connecticut the Connecticut, Housatonic, Thames, Pawcatuck, and Hudson. All except the Hudson River Basin have Corps' Flood Damage Reduction projects within their drainage areas. The following pages show where these five river basins lie in the state and the location of Corps' Flood Damage Reduction projects in the Connecticut, Housatonic, Thames, and Pawcatuck River Basins.

(Note: Of the 13,366 square miles in the Hudson River Basin, only 36 square miles, or 0.3 percent, lie in Connecticut).



Connecticut River Basin

The Connecticut River Basin, one of the largest river basins in New England, stretches from southern Quebec to Long Island Sound, off the Connecticut coast.

Of the 11,250 square miles in the basin, 1436 square miles, or about 13 percent, lie in Connecticut; 3928 square miles, or 35 percent, lie in Vermont; 3046 square miles, or about 27 percent, lie in New Hampshire; and 2726 square miles, or 24 percent, lie in Massachusetts. About 114 square miles (one percent) are located in Quebec.

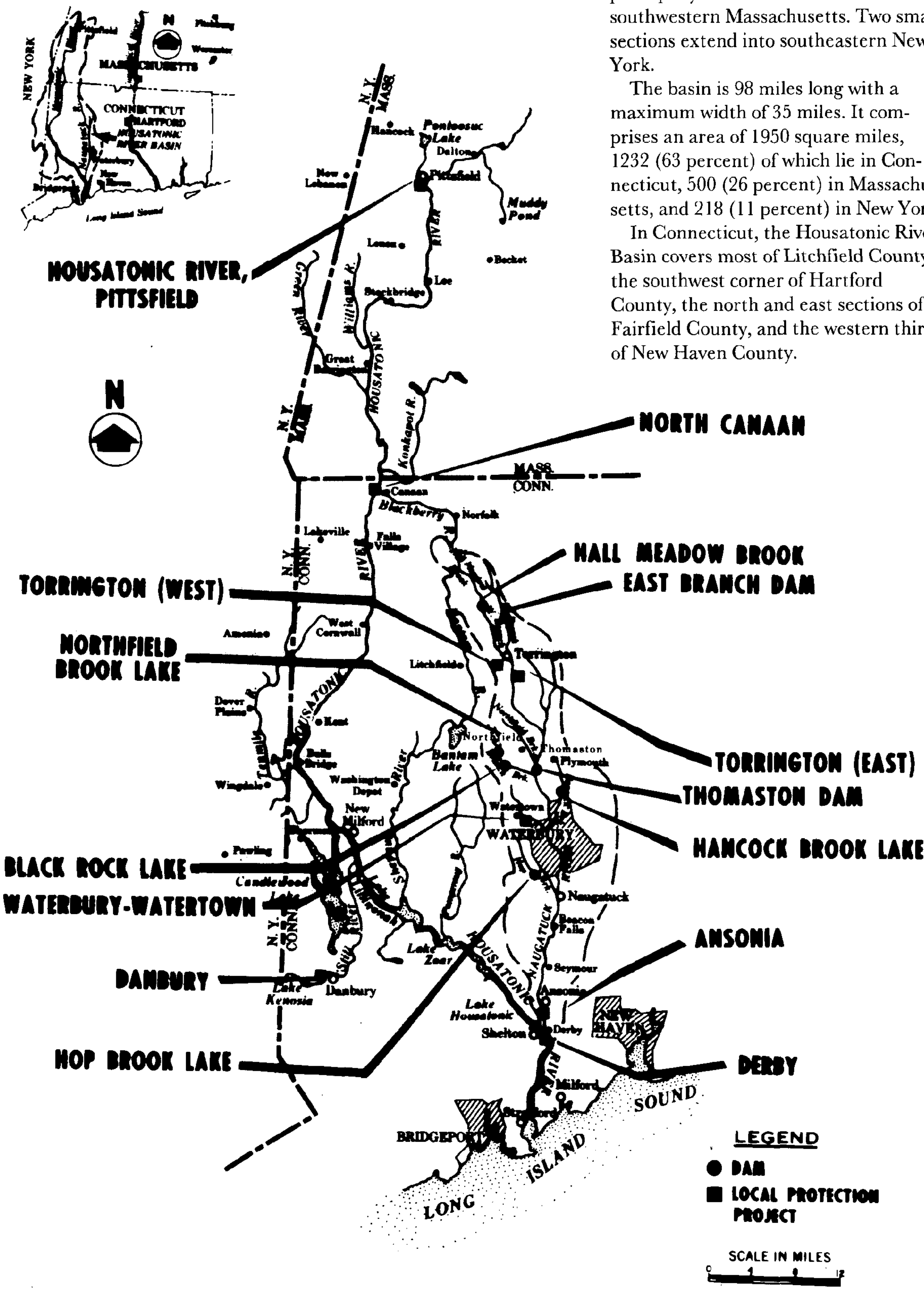
The Connecticut River Basin has a total length of 280 miles and a maximum width of 60 miles. In Connecticut, it occupies most of Hartford and Middlesex Counties and minor portions of Tolland, Litchfield, New London, and New Haven Counties.

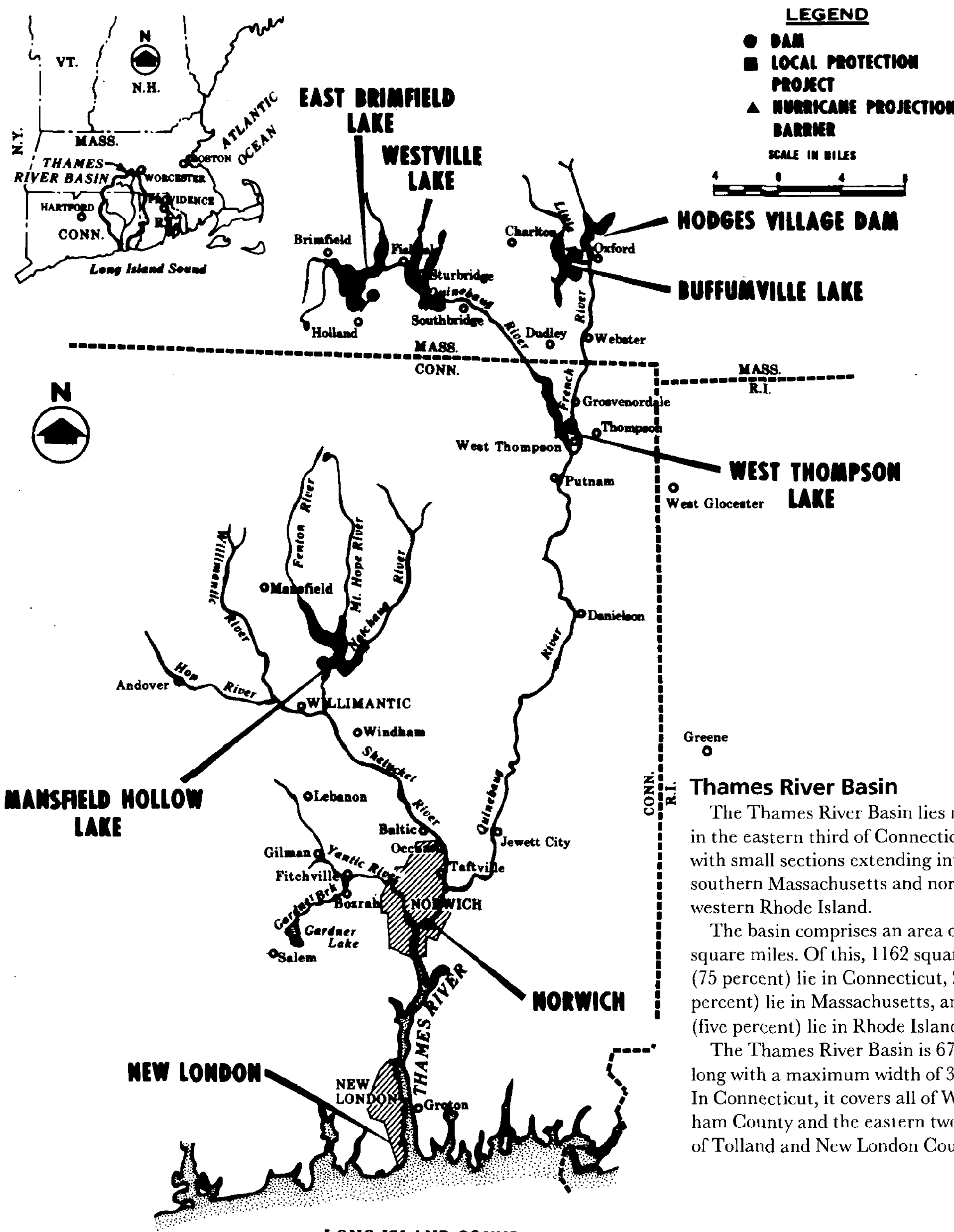
Housatonic River Basin

The Housatonic River Basin lies principally in western Connecticut and southwestern Massachusetts. Two small sections extend into southeastern New York.

The basin is 98 miles long with a maximum width of 35 miles. It comprises an area of 1950 square miles, 1232 (63 percent) of which lie in Connecticut, 500 (26 percent) in Massachusetts, and 218 (11 percent) in New York.

In Connecticut, the Housatonic River Basin covers most of Litchfield County, the southwest corner of Hartford County, the north and east sections of Fairfield County, and the western third of New Haven County.





Thames River Basin

The Thames River Basin lies mostly in the eastern third of Connecticut, with small sections extending into southern Massachusetts and north-western Rhode Island.

The basin comprises an area of 1474 square miles. Of this, 1162 square miles (75 percent) lie in Connecticut, 251 (20 percent) lie in Massachusetts, and 61 (five percent) lie in Rhode Island.

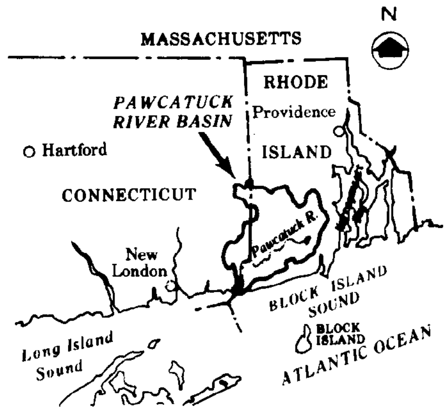
The Thames River Basin is 67 miles long with a maximum width of 38 miles. In Connecticut, it covers all of Windham County and the eastern two-thirds of Tolland and New London Counties.

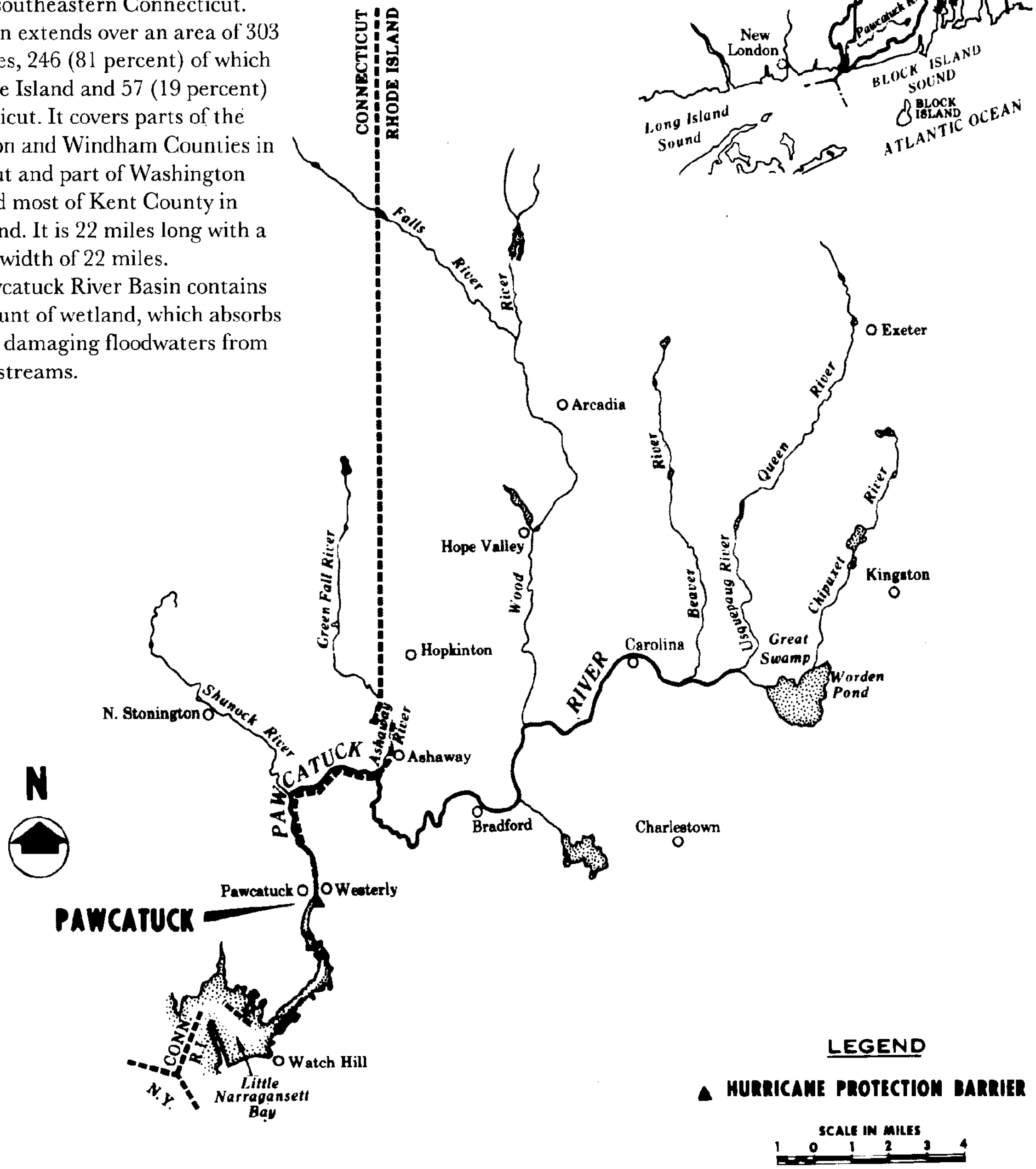
Pawcatuck River Basin

The Pawcatuck River Basin lies principally in the southwestern corner of Rhode Island. Two small portions are located in southeastern Connecticut.

The basin extends over an area of 303 square miles, 246 (81 percent) of which lie in Rhode Island and 57 (19 percent) in Connecticut. It covers parts of the New London and Windham Counties in Connecticut and part of Washington County and most of Kent County in Rhode Island. It is 22 miles long with a maximum width of 22 miles.

The Pawcatuck River Basin contains a vast amount of wetland, which absorbs potentially damaging floodwaters from rivers and streams.





Flood Damage Reduction

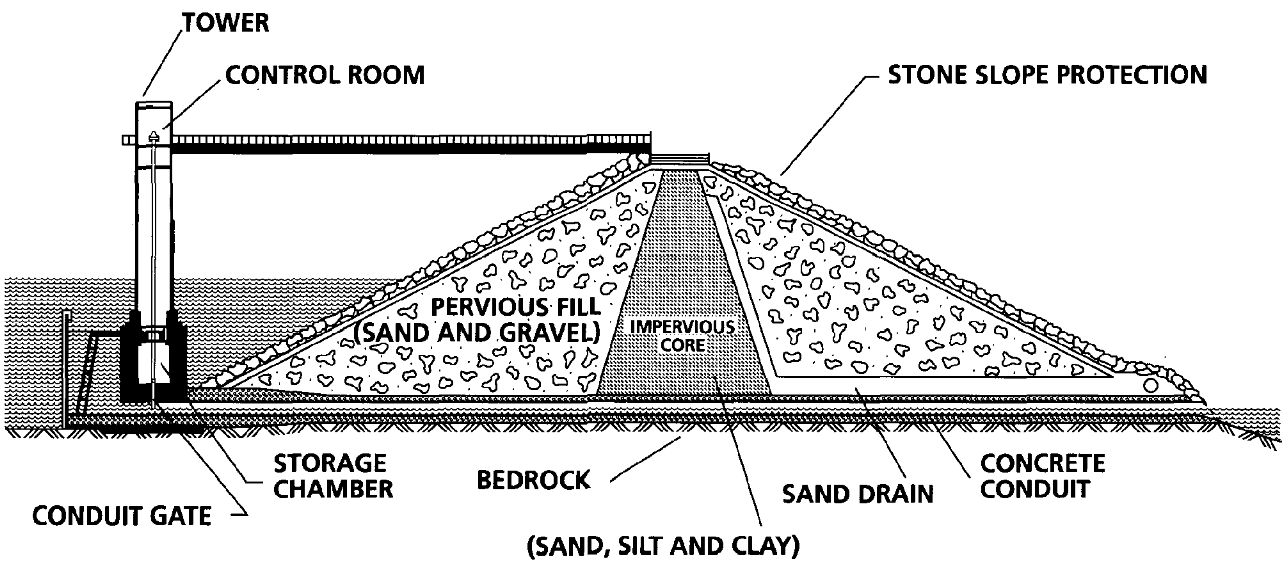
The U.S. Army Corps of Engineers has constructed dams and reservoirs, hurricane protection barriers, and local protection projects to reduce flooding damages in Connecticut.

The 12 Corps-built dams in Connecticut protect wide regions of the state. Costing an aggregate total of $79.1 million to construct, they have prevented flood damages estimated at $411.7 million (as of September 1990) while also offering the public a variety of recreational opportunities. The Corps owns and operates eight of the dams, while four are operated and maintained by the state.

Three hurricane protection barriers constructed by the Corps' New England Division in the state dissipate hurricane tides and protect the shoreline from coastal storm flooding. Costing a total of $27.3 million to build, the barriers have prevented flood damages estimated at $6.7 million. The local communities operate and maintain their respective hurricane protection barrier, except for the navigation gates at the Stamford barrier, which are operated by the Corps.

The Corps has also completed 14 other flood damage reduction projects in Connecticut at a cost of $119.8 million. It is estimated that these works, more commonly referred to as local protection projects because they provide flood protection to specific communities rather than wide areas of a state, have prevented about $532.7 million in flood damages. They are operated and maintained by the respective cities and towns.

The following pages give a brief history and description of the flood damage reduction projects constructed by the Corps in Connecticut. Figures given for damages prevented by each flood control project are estimated through September 1990.



TYPICAL CROSS SECTION OF AN EARTHFILL DAM

Flood Damage Reduction Projects in Connecticut

Dams and Reservoirs

Black Rock Lake in Thomaston and Watertown
Colebrook River Lake in Colebrook
East Branch Dam in Torrington
Hall Meadow Brook Dam in Torrington
Hancock Brook Lake in Plymouth
Hop Brook Lake in Naugatuck, Middlebury, and Waterbury
Mad River Lake in Winchester
Mansfield Hollow Lake in Mansfield and Windham
Northfield Brook Lake in Thomaston and Litchfield
Sucker Brook Dam in Winchester
Thomaston Dam in Thomaston
West Thompson Lake in Thompson

Hurricane Protection Barriers

New London
Pawcatuck
Stamford

Local Protection Projects

Ansonia
Byram River, Greenwich
Danbury
Derby
East Hartford
Folly Brook, Wethersfield
Hartford
North Canaan
Norwalk
Norwich
Torrington - East Branch
Torrington - West Branch
Waterbury/Watertown
Winsted

Black Rock Lake

area of 20.4 square miles.

Black Rock Lake is stocked with trout by the state of Connecticut. The lake also offers bass, pickerel, perch, horned pout, and bluegills. Reservoir lands offer the public opportunities for hunting (pheasant is stocked by the state), hiking, canoeing, and cross-country skiing. An overlook area is provided at the top of the dam.

Black Rock State Park, operated and owned by the state of Connecticut and lying adjacent to the dam, offers swimming, picnicking, camping, and sanitary facilities.

Colebrook River Lake

The dam at Colebrook River Lake is located on the west branch of the Farmington River in Colebrook, approximately two miles south of the Massachusetts state line. From Winsted, it is six miles north on Route 8.

The Colebrook River Lake Dam has substantially reduced flooding along the main stem and West Branch of the Farmington River and downstream flooding along the Connecticut River. Since its construction, the dam has prevented $32.9 million in flood damages. It is a multipurpose reservoir, supplying water for the Hartford Metropolitan District and supporting downstream fishery habitat in addition to its flood control function.

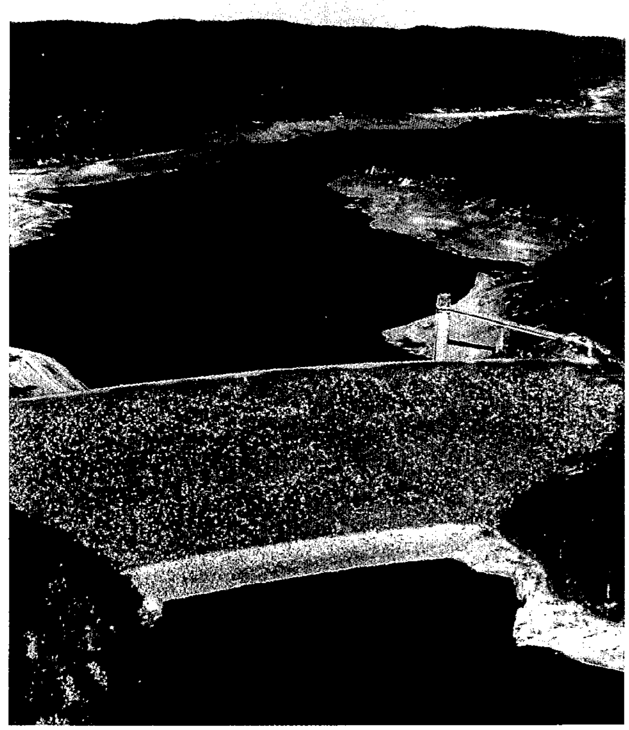
The Colebrook River Lake Dam is one of three flood control dams (Mad River and Sucker Brook dams being the others) that were constructed as a result of major flooding

Black Rock Lake

The dam at Black Rock Lake is located adjacent to Black Rock State Park along the Thomaston-Watertown line. The reservoir is on Route 109, two miles west of Thomaston and within one mile of the intersection of Route 8 and U.S. Route 6. The project consists of an earthfill dam with stone slope protection 933 feet long and 154 feet high; a gated 704-foot-long circular concrete conduit four feet wide and five feet high; and a concrete chute spillway channel with a 140-foot-long weir. The weir's crest elevation is 20 feet lower than the top of the dam. Project construction started in July 1967 and was completed in July 1971. About 1.9 miles of Route 109 were relocated to accommodate the project. The cost of construction was $8.2 million.

Black Rock Lake Dam has prevented flood damages of $58.5 million in downstream communities on the Naugatuck River and lower Housatonic River.

Black Rock Lake contains a 21-acre recreation pool that has a depth of 27 feet. The flood storage area of the project, which is normally empty and is utilized only to store floodwaters, stretches out over 190 acres in both Thomaston and Watertown. Together, the lake and associated lands total 319 acres. Black Rock Lake can store up to 2.83 billion gallons of water for flood control purposes. This is equivalent to eight inches of water covering its drainage



Colebrook River Lake

from Hurricane Diane that devastated Connecticut in August 1955 (see page 10). Construction of the dam at Colebrook River Lake started in May 1965 and was completed in June 1969, costing $14.3 million. The town of Colebrook was completely relocated, as was Dubois Cemetery in Sandisfield, Massachusetts, and portions of Route 8 (3.5 miles in Connecticut and 3.4 miles in Massachusetts).

The project consists of an earthfill dam with stone slope protection 1300 feet long and 223 feet high; an earthfill dike 1240 feet long and 54 feet high; a gated circular outlet tunnel edged in rock 774 feet long and 10 feet in diameter; and a chute spillway cut in rock with a 205-foot-long concrete weir. The weir's crest elevation is 29 feet lower than the top of the dam.

The amount of water stored at Colebrook River Lake can fluctuate substantially. The pool, used for both water supply and fishery habitat, normally covers an area of about 750 acres. When filled to capacity with floodwaters, however, the pool covers 1185 acres. Together, the lake and associated lands stretch out over 1618 acres in Colebrook and the Massachusetts towns of Sandisfield and Tolland. Colebrook River Lake can store up to 16.56 billion gallons of water for flood control purposes. This is equivalent to eight inches of water covering its drainage area of 118 square miles.

A hydroelectric power facility at Colebrook River Lake, developed by the Metropolitan District of Hartford, began generating electricity in 1989. The 3.3 megawatts of power is sold to the Connecticut Light and Power Company.

Colebrook River Lake offers lake fishing and one mile of stream fishing. The fish and game agencies of Connecticut and Massachusetts stock trout and salmon to complement the native bass, pickerel, perch, horned pout, and bluegill. Reservoir waters are open to licensed fishermen under the regulations established by the Connecticut Department of Environmental Protection. A large boat launching ramp, a boat landing area, and sanitary and parking facilities are also available.

East Branch Dam

East Branch Dam is located in Torrington on the East Branch of the Naugatuck River. From Torrington Center, it can be reached travelling one mile north on Main Street, then two miles west on Newfield Street. The project consists of an earthfill dam 700 feet long and 92 feet high; an ungated circular concrete conduit 450 feet long and three feet in diameter; and a chute spillway edged in rock with a 100-foot-long concrete weir. The weir's crest elevation is 16 feet lower than the top of the dam.

The dam impounds the floodwaters of the East Branch of the Naugatuck River, providing protection to Torrington. It operates in conjunction with the Hall Meadow Brook Dam and the two local protection projects in Torrington. The East Branch Dam has prevented $10.5 million of flood damage since its construction. Of that amount, $6.3 million in damage was prevented during the heavy rains of April 1987.

East Branch Dam

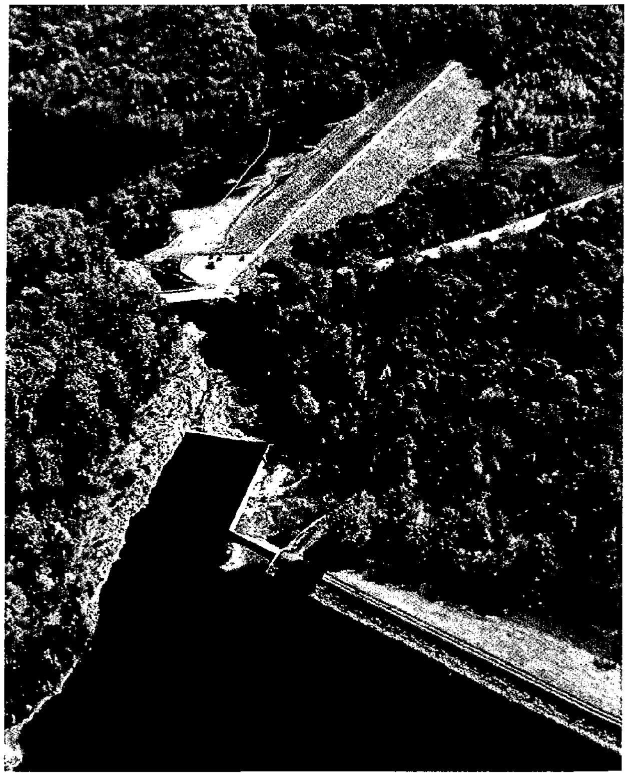
Construction of the dam began in March 1963 and was completed in June 1964. A 1.5-mile section of town road was relocated. Following completion, the project and associated lands were transferred to the state of Connecticut for operation and maintenance. Construction costs totaled $3.3 million.

There is no lake at East Branch Dam. The flood storage area of the project, which is normally empty and is only utilized to store floodwaters, covers 158 acres. East Branch Dam can store up to 1.42 billion gallons of water for flood control purposes. This is equivalent to 8.9 inches of water covering its drainage area of 9.3 square miles.

The state stocks the East Branch of the Naugatuck River with brook and brown trout. A recreation area operated by the City of Torrington offers bow hunting for deer and small game. Park lands are used by several groups, including a radio controlled airplane club.

Hall Meadow Brook Dam

Hall Meadow Brook Dam is located in Torrington on Hall Meadow Brook. It is situated west of Torrington on Route 4, then north on Route 272 for about six miles. The project includes an earthfill dam with stone slope protection 73 feet high and 1200 feet long across Hall Meadow Brook; a



Hall Meadow Brook Dam

315-foot ungated circular concrete conduit four feet in diameter; and a chute spillway edged in rock with a concrete weir 100 feet long. The weir's crest elevation is 19 feet lower than the top of the dam. There is also a 1200-foot diversion canal that directs floodwaters from the Reuben Hart Water Supply Reservoir to the Hall Meadow Brook Reservoir. The Reuben Hart Water Supply Reservoir is owned and operated by the Torrington Water Company.

In conjunction with the East Branch Dam and the two local protection projects in Torrington, the Hall Meadow Brook Dam provides flood protection to the upper Naugatuck Valley communities of Torrington, Harwinton, and Litchfield. Torrington was one of the communities hardest hit by the August 1955 flood, which took eight lives and caused damages of $22 million in Torrington alone. Since its construction, East Branch Dam has prevented flood damages of $9.6 million, including $4.9 million during the heavy rains of April 1987.

Construction of the dam was started in March 1961 and finished in June 1962. Upon completion, the project was transferred to the state of Connecticut for operation and maintenance. The project required relocation of 2.2 miles of Route 72. Construction costs totaled $3.1 million.

There is no lake at Hall Meadow Brook Dam. The flood storage area of the project, which is normally empty and is utilized only to store floodwaters, covers 372 acres and extends for 2.9 miles into Goshen. Hall Meadow Brook Dam can store up to 2.81 billion gallons of water for flood control purposes. This is equivalent to 9.4 inches of water covering its drainage area of 17.2 square miles.

The reservoir area is operated and managed by the state as John Minetto State Park. It offers picnic tables and a picnic shelter, fireplaces, drinking water, and parking and sanitary facilities. An open field is available for group activities, such as volleyball, softball, touch football, and cross-country skiing. In addition, the state has built a two-acre pond that offers swimming. Rainbow, brown, and brook trout fishing is available. Waterfowl, such as ducks and geese, and stocked pheasant may be hunted in season.

Hancock Brook Lake

The dam at Hancock Brook Lake is located in Plymouth on Hancock Brook, a tributary of the Naugatuck River. It is situated about 4.5 miles north of Waterbury. From Plymouth, it can be reached by taking Route 262 west to Graystone Road.

The project stores floodwaters to reduce flood damages on the Naugatuck River and the lower Housatonic River. Since its construction, it has prevented damages of $27.2 million.

Construction began in July 1963 and was completed in September 1966. The total cost was $4.2 million. Project construction required the relocation of 1.3 miles of town roads and about two miles of railroad track.

Hancock Brook Lake

The project consists of an earthfill dam with stone slope protection 630 feet long and 57 feet high; a 2300-foot-long earthfill dike with a maximum height of 35 feet along the relocated railroad track; an ungated 250 foot-long rectangular concrete conduit three feet wide and four feet six inches high; and a chute spillway cut in rock with a concrete weir 100 feet long. The weir's crest elevation is 21 feet lower than the top of the dam. Maintenance of the dike is the responsibility of the railroad company.

Hancock Brook Lake contains a 40-acre conservation pool that has a maximum depth of six feet. The flood storage area of the project, which is normally empty and is utilized only to store floodwaters, totals 266 acres. The lake and associated lands cover 721 acres, of which 60 percent are wooded. When combined with adjoining state forest lands, over 2500 acres are available to the public. Hancock Brook Lake can store up to 1.27 billion gallons of water for flood control purposes. This is equivalent to 6.3 inches of water covering its drainage area of 12 square miles.

The lake contains bass and perch, and the state administers a trout stocking program. Stocked pheasant and native small game may be hunted in season. Reservoir lands also offer the public opportunities for hiking, canoeing, and cross-country skiing.

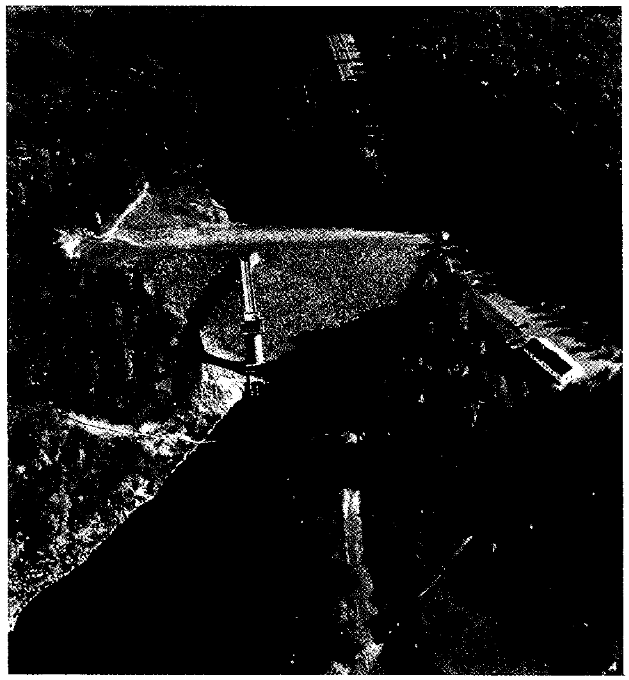
Hop Brook Lake

Hop Brook Lake is spread over three communities: Naugatuck, Middlebury, and Waterbury. The dam is situated on Hop Brook in Naugatuck. It can be reached by travelling three miles north on Route 63 from the center of Naugatuck. The project includes an earthfill dam with stone slope protection 520 feet long and 97 feet high; an earthfill dike measuring 400 feet long and 33 feet high; a gated rectangular 425-foot-long concrete conduit three feet wide and five feet high; and a chute spillway edged in rock with a 200-foot-long broad-crested weir. The weir's crest elevation is 17 feet lower than the top of the dam.

The project has substantially reduced flooding along the Naugatuck River and lower Housatonic River, preventing damages of $30.2 million.

Construction of the dam commenced in December 1965 and was completed in December 1968, costing $6.2 million. The relocation of 1.8 miles of Route 63 was required.

Hop Brook Lake contains a 21-acre recreation pool that has a maximum depth of 18 feet. The flood storage area of the project, which is normally empty and is only utilized to store floodwaters, is 1.5 miles long and spreads out over 270 acres. The project and associated lands total 553 acres throughout Naugatuck, Middlebury, and Waterbury. Hop



Hop Brook Lake

Mad River Lake

Brook Lake can store up to 2.23 billion gallons of water for flood control purposes. This is equivalent to eight inches of water covering its drainage area of 16.4 square miles.

Hop Brook Lake contains largemouth bass and panfish. The state stocks both the lake and its feeder streams with trout. Recreational development of the reservoir includes picnic sites and a picnic shelter, walking trails, a beach, ball field, drinking water, and sanitary and parking facilities. Visitors can also enjoy canoeing.

Mad River Lake

The dam at Mad River Lake is located on the Mad River in Winchester. From Winsted, it is two miles west on U.S. 44. The project consists of an earthfill dam with stone slope protection 940 feet long and 178 feet high; an earthfill dike with stone slope protection 2340 feet long and 60 feet high; a 923-foot-long ungated circular concrete conduit with a diameter of three feet nine inches; and a concrete chute spillway with a 340-foot-long concrete weir. The weir's crest elevation is 13 feet lower than the top of the dam.

In conjunction with Sucker Brook Dam, Mad River Dam reduces flooding on the Mad and Still Rivers. It has prevented flood damages of $2.6 million since its construction.

The project started in June 1961 and was completed in June 1963. The relocation of 2.3 miles of Route 44 was required. Following completion, the project and associated lands were transferred to the state of Connecticut for operation and maintenance. Construction costs totaled $5.4 million.

Mad River Lake is a 10-acre recreation pool with a maximum depth of 17 feet. The flood storage area of the project, which is normally empty and is utilized only to store floodwaters, totals 188 acres. Mad River Lake can store up to 3.1 billion gallons of water for flood control purposes. This is equivalent to 10 inches of water covering its drainage area of 18.2 square miles.

The state stocks trout in both the lake and the Mad River. Pheasant is stocked on the adjacent lands. Partridge and other small game hunting is also available.

Mansfield Hollow Lake

Mansfield Hollow Lake lies within the boundaries of Mansfield and Windham, 25 miles east of Hartford. The damsite is located on the Natchaug River. From Hartford, Mansfield Hollow Lake can be reached by taking Interstate 84 to Route 195 north. The dam consists of earthfill with stone slope protection. It has a length of 14,050 feet and a height of 68 feet. The project also consists of six earthfill dikes with stone slope protection that total 2656 feet in length and have a maximum height of 53 feet. A concrete spillway spans the main channel of the Natchaug River with a concrete weir 690 feet long. The weir's elevation is 16 feet lower than the top of the dam. There are

Mansfield Hollow Lake

five gated rectangular conduits five feet six inches wide and seven feet high that vary in length up to 26 feet.

The project provides substantial flood protection for the Shetucket River communities of Norwich, South Windham, Baltic, Occum, Taftville, and Willimantic. It has prevented damages of $34 million.

Construction of the dam began in 1949 and was completed in May 1952. The cost of the project was $6.5 million.

The lake at Mansfield Hollow stretches over 450 acres through Mansfield, Windham, and Chaplin. It has a maximum depth of 16.5 feet. The flood storage area of the project, which is normally empty and is only utilized to store floodwaters, totals 1880 acres and extends about three miles up the Natchaug River, 2.3 miles up the Mount Hope River, and 3.2 miles up the Fenton River. The project and associated lands cover 2581 acres. Mansfield Hollow Lake can store up to 8.3 billion gallons of water for flood control purposes. This is equivalent to 6.1 inches of water covering its drainage area of 159 square miles.

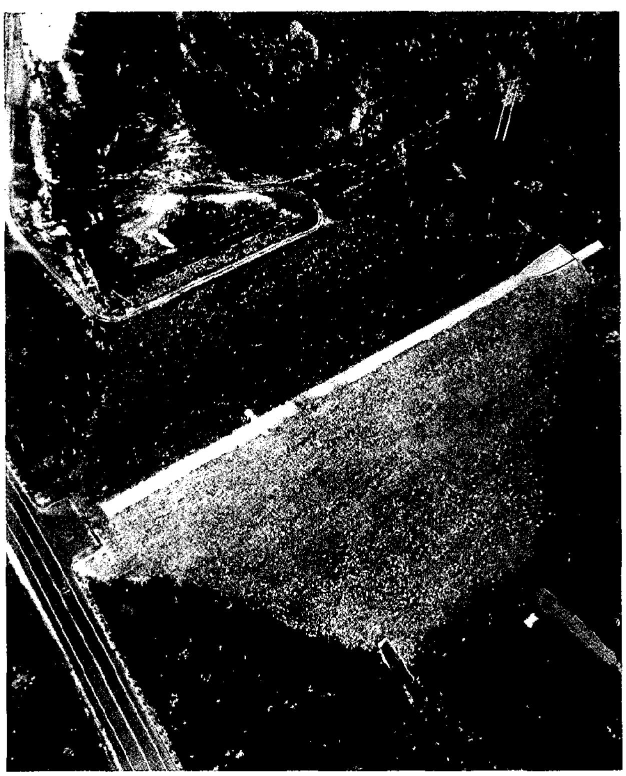
The state of Connecticut manages Mansfield Hollow Lake, which is becoming an increasingly popular recreational attraction. On a graceful, pine-covered bluff overlooking the broad expanse of water, picnic tables and fireplaces for both families and large groups are available. Many acres of open field lie adjacent to the bluff and may be used for softball, touch football, volleyball, and other team sports and group activites. A 4.5-mile walking/cross-country skiing trail leads through former pastures and the stone foundation remnants of former homesteads. The persistent hiker may find evidence of habitation by the Nipmuck Tribe. Other park facilities include a boat ramp, drinking water, and parking and sanitary areas.

The lake provides excellent boating for sailboats, canoes, and small power boats. Fishermen can expect to find trout, bass, horned pout, and perch. In-season hunting of pheasant, quail, partridge, and small game animals is also permitted.

Guests at Mansfield Hollow Lake may wish to visit the village of Mansfield Hollow, located adjacent to the dam. This area has been designated a State Historic District and placed on the National Register of Historic Places in recognition of its unique characterization of a 19th century rural village.

Northfield Brook Lake

Northfield Brook Lake lies within the boundaries of Thomaston and Litchfield, with the damsite situated in Thomaston. The reservoir is two miles west of Thomaston on Route 254. The project consists of an earthfill dam with stone slope protection 810 feet long and 118 feet high; a 544-foot-long gated circular concrete conduit with a diameter of three feet; and a chute spillway edged in rock with a concrete weir 72 feet long. The weir's crest elevation is 15 feet lower than the top of the dam.



Northfield Brook Lake

Sucker Brook Dam

The project stores Northfield Brook floodwaters and helps to lower flood stages in downstream communities along the Naugatuck River. Since its construction, the dam has prevented damages of $14.4 million.

Construction of the dam began in May 1963 and was completed in October 1965. Approximately 1.8 miles of highway was relocated. The cost of the project was $2.9 million.

Northfield Brook Lake contains an seven-acre recreation pool that has a maximum depth of 19.5 feet. The flood storage area of the project, which is normally empty and is utilized only to store floodwaters, covers about 67 acres and extends 1.25 miles. The project and associated lands total 235 acres. Northfield Brook Lake can store up to 792 million gallons of water for flood control purposes. This is equivalent to eight inches of water covering its drainage area of 5.7 square miles.

The dam is situated in a scenic area adjacent to the highly industrialized Naugatuck Valley, where public recreational facilities are at a premium. Trout is stocked in the lake, and the grounds contain picnic tables and shelters, fireplaces, a beach, hiking trail, change house, and parking and sanitary facilities. Drinking water is also available.

Sucker Brook Dam

Sucker Brook Dam is located in Winchester, about two miles southwest of Winsted. From Winsted, visitors travel south on Route 263 to signs for Highland State Park. The project consists of an earthfill dam with stone slope protection 1160 feet long and 68 feet high; an ungated rectangular concrete conduit 426 feet long measuring three feet wide and three feet high; and a concrete chute spillway with a 60-foot-long concrete weir. The weir's crest elevation is 14 feet lower than the top of the dam.

The project provides flood protection for Winchester and Winsted. It acts in conjunction with the dam at Mad River Lake to reduce downstream flooding along the Mad and Still Rivers, and with the dam at Colebrook River Lake to reduce flooding along the Farmington River. Sucker Brook Dam has prevented damages of $113,000, including $76,000 during the heavy rains of April 1987.

Construction, which began in September 1966 and was completed in June 1971, required the relocation of about 1300 feet of Sucker Brook Road. Dam costs totalled $2.3 million. The state of Connecticut is responsible for the operation and maintenance of the project.

There is no lake at Sucker Brook Dam. The flood storage area of the project, which is normally empty and is only utilized to store floodwaters, covers 53 acres. Sucker Brook Dam can store up to 482 million gallons of water for flood control purposes. This is equivalent to 8.1 inches of water covering its drainage area of 3.4 square miles.

Hunters will find small game, such as rabbits and partridge, and stocked pheasant.

Thomaston Dam

Thomaston Dam

Thomaston Dam is located in Thomaston on the Naugatuck River, the major tributary of the Housatonic River. It is about one mile north of Thomaston on Route 222. The project consists of an earthfill dam with stone slope protection 142 feet high and 2000 feet long; a gated 455-foot horseshoe shaped concrete conduit 10 feet in diameter; and a side channel spillway edged in rock with a 435-foot-long concrete weir. The weir's crest elevation is 23 feet lower than the top of the dam.

Thomaston Dam provides flood protection in the highly industrialized and densely populated Naugatuck Valley. It is the largest and most important flood control dam in the Naugatuck River system, and has prevented damages of $213.6 million in Thomaston, Waterbury, Naugatuck, Beacon Falls, Seymour, Ansonia, and Derby.

Construction started in May 1958 and was completed in November 1960. The work required relocation of portions of Routes 8 and 222 (Blakeman Road), several town roads, and a portion of the Devon Branch of the Conrail railroad. Project costs were $14.3 million.

There is no lake at the Thomaston Dam. The flood storage area of the project, which is normally empty and is only utilized to store floodwaters, covers 960 acres. The project and associated lands total 1436 acres, of which 1000 are wooded. These lands extend into the towns of Litchfield, Harwinton, and Plymouth. Thomaston Dam can store up to 13.69 billion gallons of water for flood control purposes. This is equivalent to 8.1 inches of water covering its drainage area of 97.2 square miles.

There is a 60-mile trail system for snowmobiles and two-wheel trail bikes on the Thomaston Dam lands. Fishing enthusiasts will find that Leadmine Brook, a tributary of the Naugatuck River that flows near the dam, is stocked with brown, brook, and rainbow trout. In-season hunting for stocked pheasant and native small game is permitted. Overlook and picnic areas offer an excellent view of the dam and portions of the Naugatuck River Valley. Fireplaces and parking and sanitary facilities are also available.

West Thompson Lake

The dam at West Thompson Lake is located in Thompson on the Quinebaug River, about 1000 feet upstream from the junction of the Quinebaug and French Rivers. It is three miles north of Putnam on Route 12. The project consists of an earthfill dam with stone slope protection 2550 feet long and 70 feet high; an earthfill dike with stone slope protection measuring 1650 feet long and 30 feet high; a gated horseshoe shaped concrete conduit 254 feet long and 12 feet in diameter; and a side channel concrete chute spillway with a 320-foot-long L-shaped concrete weir. The weir's crest elevation is 19 feet lower than the top of the dam.

The project has prevented flood damages of $12.3 million in Putnam and other downstream areas along the Quinebaug River.

Construction started in August 1963 and was completed in October 1965. The relocation of 3.3 miles of town roads was required. The cost of the project was $7 million.

West Thompson Lake contains a 200-acre conservation pool that has a maximum depth of 13 feet. The flood storage area of the project, which is normally empty and is only utilized to store floodwaters, totals 1250 acres and extends seven miles upstream. The project and associated lands cover 2033 acres in both Thompson and Dudley, Massachusetts. West Thompson Lake can store up to 8.34 billion gallons of water for flood control purposes. This is equivalent to 6.5 inches of water covering its drainage area of 173.5 square miles.

Reservoir lands support a variety of recreational activities. Facilities include a picnic area and shelter, boat ramp, nature trail, fireplaces, hot showers, drinking water, an amphitheater for weekend campfire programs, and parking and sanitary facilities. One of the main features of West Thompson Lake is a rustic camping area with 22 camp sites, two Adirondack shelters, and a trailer sanitary disposal station. Reservoir lands are also available for snowmobiling and cross-country skiing.

West Thompson Lake offers an excellent spot for hunting and fishing in the scenic upper Quinebaug Valley. The lake contains bass, perch, pickerel, and horned pout. Northern pike, which have been moving down the Quinebaug River, may also be found. In-season hunting of pheasant, quail, partridge, and small game animals is available.

West Thompson Lake

HURRICANE PROTECTION BARRIERS

New London

Pawcatuck

Stamford

The New London Hurricane Protection Barrier

New London

The New London Hurricane Protection Barrier is located along the New London waterfront at Shaw Cove on the Thames River. It is about 45 miles southeast of Hartford.

New London suffered damaging floods from hurricanes in 1938, 1944, 1954, and 1960. Damages from 1954's Hurricane Carol amounted to $3.8 million, of which $2.4 million could have been prevented if a hurricane protection barrier had existed. The barrier today protects about 173 acres of industrial and commercial areas in the vicinity of Shaw Cove from hurricane and severe coastal storm flooding, and safeguards against interior flooding caused by overflows from Truman Brook. In the relatively short time since its completion, the New London Hurrricane Protection Barrier has already prevented flood damages of $25,000. In a recurrence of the hurricane of 1938, the barrier would prevent an estimated $11.5 million in flood damage.

Construction started in August 1978 and was completed in May 1986, costing $12 million. The relocation of electric, water, sewer, telephone, and drainage lines were required. The barrier is operated and maintained by the city.

The project consists of an earthfill dike with stone slope protection approximately 715 feet long with a maximum elevation of 14.5 feet; a concrete floodwall about 800 feet long with a maximum elevation of 14.5 feet; two revetments that have a total length of 925 feet; a gated 1800-foot-long concrete conduit eight feet in diameter that intercepts flows from Truman Brook and discharges into Shaw Cove; and a pumping station that discharges flows through the dike during unusually high tides. The project also included the construction of a raised railroad embankment; the dredging of Shaw Cove; and the demolition of waterfront structures.

Pawcatuck

The Pawcatuck Hurricane Protection Barrier is located in the Pawcatuck section of Stonington on the west bank of the Pawcatuck River.

Like other Connecticut coastal communities, Pawcatuck has suffered serious flooding from hurricanes in 1938, 1944, 1954, and 1960, as well as other severe coastal storms. Hurricane Carol of 1954 caused damages estimated at $1.09 million, of which about $851,000 could have been prevented if a hurricane protection barrier had existed at that time. Today, the barrier protects 34 acres of highly industrialized land from tidal surges.

Construction began in June 1962, and was completed in September 1963. The cost of the project was $859,000. Operation and maintenance is the responsibility of Stonington.

The project consists of 1915 feet of earthfill dike and 940 feet of concrete wall, both with an elevation of 17 feet;

two vehicular gates; and a pumping station. The project protection begins 0.7 mile south of the U.S. Route 1 Bridge and extends 2200 feet northward along the west bank of the river.

Stamford

The Stamford Hurricane Protection Barrier is located in Stamford on Stamford Harbor, about 20 miles southwest of Bridgeport.

Stamford has been subject to heavy losses from storm tidal flooding since 1635. The September 1938 hurricane resulted in losses in the project area of almost $6 million. Hurricane Carol in 1954 caused $3.4 million in damage, of which $2.9 million could have been prevented if a hurricane barrier had existed at that time. The barrier today provides protection to about 600 acres, which includes principal manufacturing plants, a portion of the main commercial district, and residential sections. Since its completion, the barrier has prevented damages of $7.1 million from hurricanes and other severe coastal storms.

Construction of this project started in May 1965 and ended in January 1969, costing $14.5 million. The city operates and maintains the Stamford Hurricane Protection Barrier, with the exception of the navigation gates, which are operated and maintained by the Corps.

The project consists of three elements. The first, a barrier at the east branch of Stamford Harbor, is composed of a 2850-foot-long earthfill dike with stone slope protection. It has an elevation of 17 feet. A 90-foot-wide opening is provided for navigation, and a pump station discharges interior drainage.

The second element is a barrier that provides protection at the west branch of the harbor. This barrier, which has an elevation of 17 feet, is composed of a 1350-foot-long concrete wall; 2950 feet of earthfill dike with stone slope protection; and a pumping station.

The third portion provides protection at Westcott Cove. This barrier is a 4400-foot earthfill dike with stone slope protection having a maximum elevation of 19 feet. It also has two pumping stations.

The Pawcatuck Hurricane Protection Barrier

The Stamford Hurricane Protection Barrier

LOCAL PROTECTION PROJECTS

Ansonia

Byram River, Greenwich

Danbury

Derby

East Hartford

Folly Brook, Wethersfield

Hartford

North Canaan

Norwalk

Norwich

Torrington - East Branch

Torrington - West Branch

Waterbury/Watertown

Winsted

The Ansonia Local Protection Project cost $20.2 million to construct and has already prevented flood damages of $37.4 million.

Ansonia

The Ansonia Local Protection Project is located along the Naugatuck River and Beaver Brook in southwestern Ansonia and along the Naugatuck River in northwestern Derby. It provides substantial protection for 440 acres of highly developed industrial, commercial, and residential land in Ansonia and Derby. Since its construction, it has prevented flood damages of $39.4 million.

Construction started in October 1968 and was completed in January 1973. The cost of the project was $20.2 million. It is operated and maintained by Ansonia.

About 10,400 feet of earthfill dikes and 5600 feet of concrete floodwall constitute the major portion of the project. The works lie along the east bank of the river from Maple Street to the mouth of Beaver Brook, along both banks of Beaver Brook near its mouth, along both banks above Maple Street, and along the west bank in the vicinity of Division Street. Four pumping stations are provided to handle storm drainage and sanitary sewage. Work also included the widening and straightening of 13,000 feet of river channel; the construction of a 1400-foot conduit along Beaver Brook; and the construction of five swing gates that allow the passage of railroad and vehicular traffic.

Byram River, Greenwich

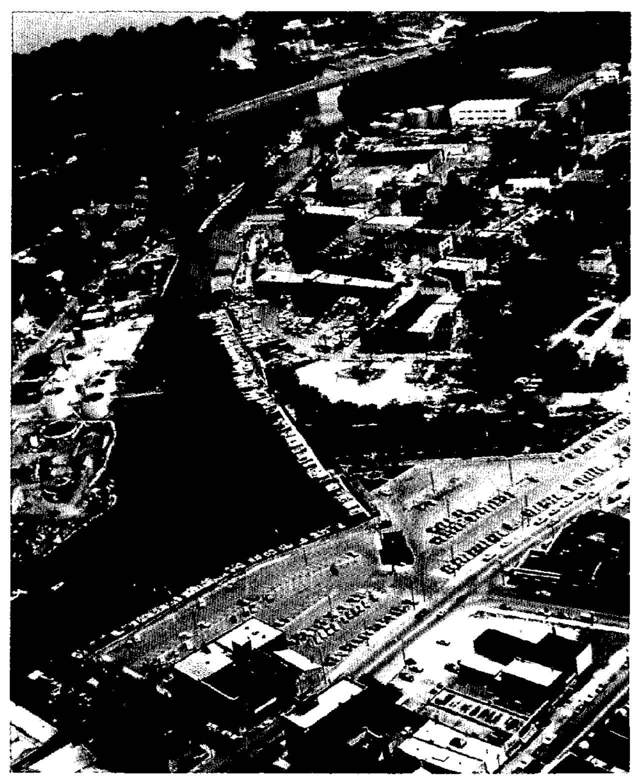
The Byram River Local Protection Project is located on the Byram River in the Pemberwick section of Greenwich, about one mile upstream of U.S. Route 1. It protects 25 acres of residential and industrial developments and has prevented flood damages of $80,000.

Construction of the project, built by the Corps' North Atlantic Division, started in July 1959 and was completed in August 1961, costing $407,000. Ellin Drive was relocated to accommodate construction. The Byram River project is a small project, built under Section 205 of the Corps' Continuing Authorities Program. It is operated and maintained by Greenwich.

The project widened, deepened, and realigned about 2400 feet of the Byram River channel. In addition, earthfill dikes were constructed on either side of the river channel 1300 feet on the right bank and 950 feet on the left bank.

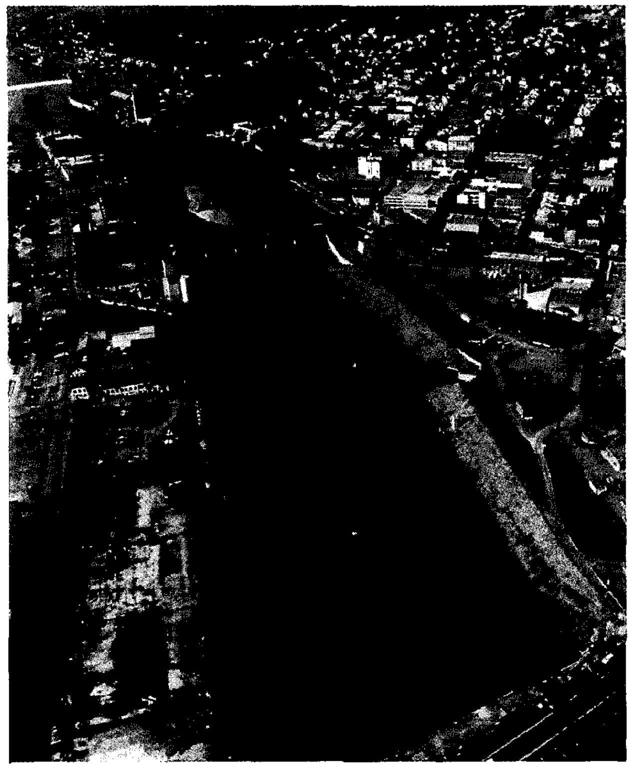
Danbury

The Danbury Local Protection Project is located along the Still River in Danbury, immediately downstream of the city's central business district. It provides protection to 90 acres of industrial, commercial, and residential land. It has prevented flood damages of $2.1 million.



The Byram River Local Protection Project included widening, deepening, and realigning 2400 feet of the Byram River channel.

The Danbury Local Protection Project (in center of photo) safeguards 90 acres of industrial, commercial, and residential land.



The Derby Local Protection Project involved the widening of the Naugatuck River channel and the construction of earthfill dikes, shown on the river's right bank in the above photo.

Project construction began in June 1974 and ended in November 1976, costing $14.3 million. Upon completion, it was transferred to Danbury for operation and maintenance.

The project consists of 3625 feet of concrete conduit and 2695 feet of enlarged and realigned Still River channel. Work also required rebuilding four railroad bridges; constructing two highway bridges; and removing a privately owned bridge.

Derby

The Derby Local Protection Project is located at the junction of the Housatonic and Naugatuck Rivers in Derby. It provides substantial protection to about 70 acres of highly developed industrial, residential, and commercial property. It has prevented flood damages of $6.7 million, including $2.4 million from the heavy rains of April 1987.

Construction of the project began in May 1970 and was completed in June 1973, costing $8.6 million. Upon completion, it was transferred to Derby for operation and maintainance.

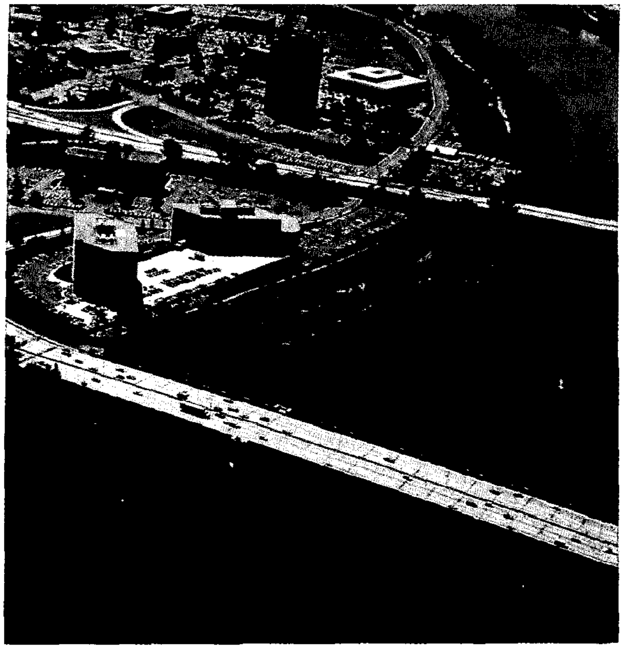
The project consists of earthfill dikes and concrete floodwalls along the Housatonic and Naugatuck Rivers. Protection along the Houstonic River starts in the vicinity of Bridge Street and extends 2050 feet downstream to the Route 8 highway embankment. Protection along the Naugatuck River extends 3200 feet downstream from the Ansonia Local Protection Project to the Route 34 Bridge. The system includes four floodgates at railroad crossings and a pumping station near the confluence of the two rivers to handle storm drainage. Construction also included the widening of the Naugatuck River channel immediately upstream of the Route 34 Bridge.

East Hartford

The East Hartford Local Protection Project is located along the east bank of the Connecticut River and the north bank of the Hockanum River in East Hartford. It provides protection for about 760 acres of residential, commercial, industrial, and public property in East Hartford. It has prevented flood damages of $170.4 million.

Construction started in December 1938 and was completed in July 1943, costing $2.4 million. The project is operated and maintained by East Hartford.

There are about 19,500 feet of earthfill dikes and 750 feet of concrete floodwalls along the Connecticut and Hockanum Rivers, extending from the high ground near Greene Terrace in the north to high ground at Brewer Lane and Central Avenue in the south. There are two stoplog structures, one each at the railroad and Main Street. Three pumping stations that discharge storm waters from behind the dike into the Connecticut River are located at Meadow Hill, Cherry Street, and Pitkin Street.



The East Hartford Local Protection Project's earthfill dike, built on the east bank of the Connecticut River, protects several hundred acres of property. The photo shows the dike, again partially hidden by trees, as its winds its way around the riverbank.

Folly Brook, Wethersfield

The Folly Brook Local Protection Project is located in Wethersfield on Folly Brook, about 0.3 mile upstream of Wethersfield Cove. The project protects about 165 acres lying along both sides of Folly Brook. The land is primarily residential and urban, consisting of single family homes and a convalescent home.

Construction of the project began in October 1977 and was completed in October 1978 at a cost of $220,000. The Folly Brook project is a small project, built under Section 205 of the Corps' Continuing Authorities Program. It is operated and maintained by Wethersfield. The Folly Brook project is a downstream extension of the Folly Brook conduit built as part of the Hartford Local Protection Project.

The project consists of 175 feet of corrugated metal pipe extending from the Folly Brook conduit (part of the Hartford Local Protection Project) to the lower end of Folly Brook in Wethersfield. The pipe passes under the Hartford Avenue Bridge and Conrail Railroad Bridge and reduces the threat of flooding in Wethersfield.

Hartford

The Hartford Local Protection Project is located along the west bank of the Connecticut River in Hartford and along the city's Park River. It provides flood protection to approximately 3000 acres of highly developed commercial, residential, and industrial land in Hartford, including the central part of the city. The project has prevented flood damages of $295 million.

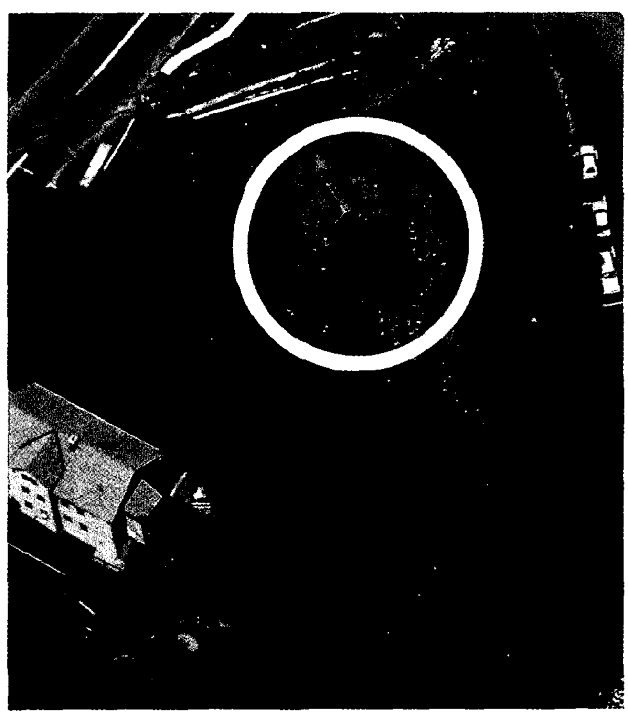
The completed works consist of dikes, floodwalls, stoplog structures, conduits, and pumping stations.

There are about 35,000 feet of earthfill dikes and 4400 feet of concrete floodwall along the Connecticut River extending from high ground on Windsor Avenue, near the Hartford-Windsor town line, to high ground south of the Hartford-Wethersfield town line. Along this perimeter are six stoplog structures that are closed when floodwaters threaten to spill into the protected area and six pumping stations that discharge storm and sanitary sewage.

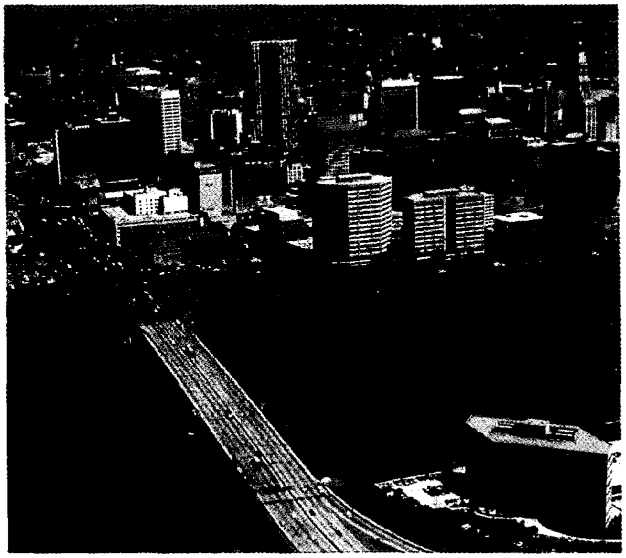
The project also includes four conduits. The first, the Park River conduit, measures over 10,000 feet long and passes beneath Bushnell Park in the central part of the city, ending at the Connecticut River. This conduit is supplemented by a second conduit, the Park River auxiliary conduit, located about 1100 feet south of the first conduit. This auxiliary conduit, 9200 feet long and lying approximately 200 feet below the surface, is the product of state-of-the-art technology and allows the Park River to be completely diverted under the city of Hartford directly to the Connecticut River. Two pumping stations support the auxiliary conduit.

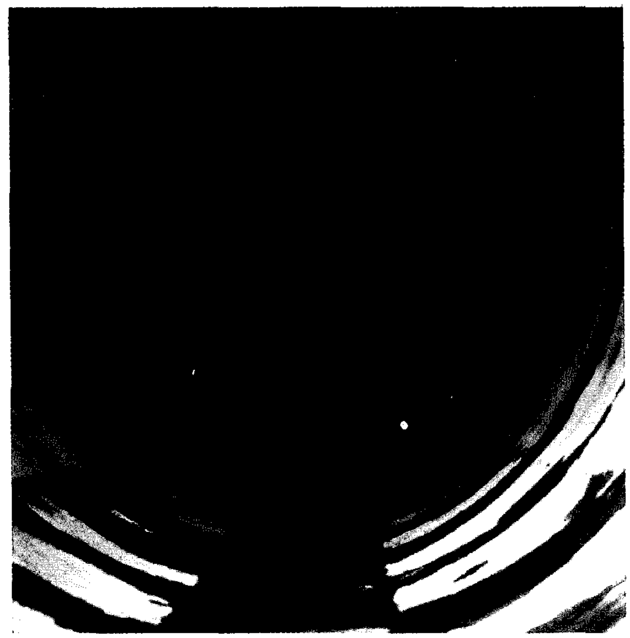
The third conduit is the 3100-foot Gully Brook conduit, which ties into the first Park River conduit. The fourth is the 2200-foot Folly Brook conduit, which ties into the conduit located at the lower end of Folly Brook in Wethersfield.

Most of these works were initiated in December 1938 and completed in August 1944. Construction of the Folly



The Folly Brook Local Protection Project (circled) helps to reduce flooding in Wethersfield.





An earthfill dike, constructed along the banks of the Connecticut River in Hartford and hidden by trees in the photo (above left), is part of a system of dikes of the Hartford Local Protection Project that helps protect about 3000 acres of highly developed property in the city. Another important component of the project is the 9200-foot-long Park River auxiliary conduit (photo above right), which diverts the Park River under Hartford directly to the Connecticut River. This auxiliary conduit, with a diameter of 22 feet, was large enough to allow railroad cars to pass through it during construction.

Brook conduit began in February 1956 and was completed in May 1957. Construction of the Park River auxiliary conduit and the two pumping stations began in June 1976 and was completed in July 1981. The total cost of the Hartford local protection project was $71.5 million. It is operated and maintained by Hartford.

North Canaan

The North Canaan Local Protection Project involved the snagging and clearing of a 6500-foot ong section of the Blackberry River. The project, which improved the flow capacity of the river, protects an area that includes residential properties along Church Street; a housing development for the elderly; and an industrial plant.

Fallen trees and heavy siltation had created a potentially dangerous flood situation. The removal of accumulated snags and debris was completed between June-September 1977, costing $73,900. This work was considered to be a small project, falling under Section 208 of the Corps' Continuing Authorities Program.

The work involved the removal of dead brush, standing dead trees, designated live trees, snags, silt, slash, and other debris hindering the passage of floodwaters. Random sand and gravel deposits were also excavated.

The project area lies between the Route 44 Bridge and a point downstream about 1800 feet from the junction of the Blackberry and Housatonic Rivers.

The North Canaan Local Protection Project involved snagging and clearing 6500 feet of the Blackberry River, which runs under the Route 44 Bridge.

Norwalk

The Norwalk Local Protection Project is located on the Norwalk River, in the vicinity of Perry Avenue in Norwalk. This project safeguards about eight acres of residential and commercial property that had been subjected to frequent flooding.

About eight acres of residential and commercial property are protected by the Norwalk Local Protection Project.

Built between October-December 1951, the project cost $52,000 and has prevented flood damages of $14,000. It is a small project, built under Section 205 of the Corps' Continuing Authorities Program. It is maintained by the city of Norwalk.

The project entailed enlarging and realigning 1700 feet of the Norwalk River channel. An 1100-foot earthfill dike was built along the west bank of the river, and a row of steel sheet piling was installed. An industrial dam was removed to facilitate construction.

The project begins about 1400 feet downstream of Merritt Parkway (Route 15) and extends to the head of Deering Pond, at the confluence with the Silvermine River.

Norwich

The Norwich Local Protection Project is located at the lower end of the Shetucket River in Norwich.The project reduces flooding on the two-mile reach extending from the head of the Thames River upstream to the Greenville Dam. It has prevented damages of $6.2 million.

The initial portion of the channel improvement project began in June 1947 and was completed in March 1949. In September 1957, work began on extending the project, which was completed in December 1958. The total cost of the Norwich Local Protection Project was $1.3 million. The channel is maintained by Norwich.

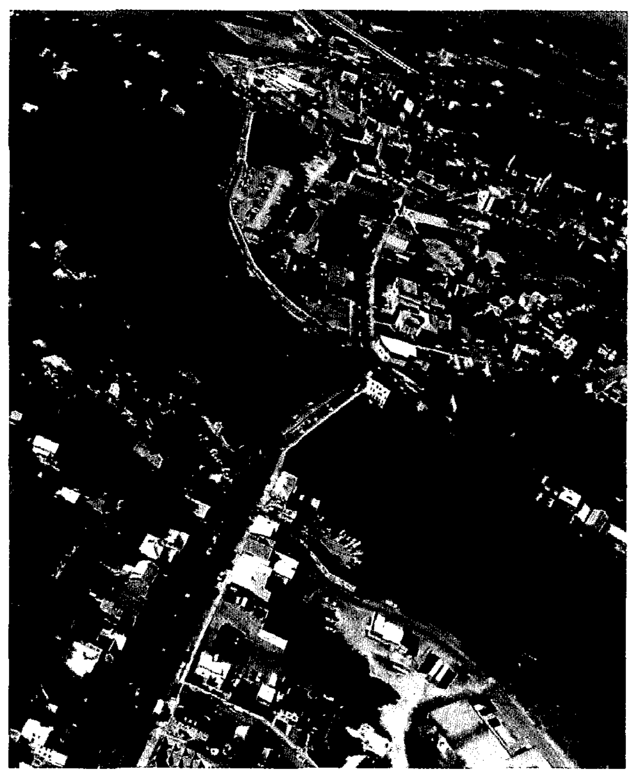
A 700-foot reach of the Shetucket River channel was deepened and widened, increasing its cross-sectional area by 40 percent. The work was centered at the Laurel Hill Bridge (Route 12), where the channel passes through a narrow rock constriction.

Torrington - East Branch

The Torrington (East Branch) Local Protection Project lies on the Naugatuck River and the Naugatuck River's east branch, near the center of Torrington.

In conjunction with the Hall Meadow Brook and East Branch Dams, the project provides flood protection to residential, commercial, industrial, and public property along the banks of both the Naugatuck River and the Naugatuck River's east branch. Specifically, this protection extends from the East Pearl Street Bridge that spans the Naugatuck River's east branch, to the vicinity of Saint Francis Cemetery on the Naugatuck River. The project has prevented flood damages of $66,000.

Construction of the project, which cost $389,000, started in July 1957 and was completed in July 1959. It is a small project, built under Section 205 of the Corps' Continuing Authorities Program. It is operated and maintained by Torrington.



The Norwich Local Protection Project involved deepening and widening a 700-foot reach of the Shetucket River.

The Torrington (East Branch) Local Protection Project has prevented damages of $66,000 along sections of the city that were severely damaged during August 1955 flood. The top photo shows a section of the earthfill dike, partially hidden by trees, as its runs along the Naugatuck River at a point below the confluence of the East and West Branches (top left of photo). Floodwalls (above left) were also constructed as part of the project. The photo on the right shows the Naugatuck River as it winds through Torrington.

Construction involved building earthfill dikes and concrete floodwalls at various points along the Naugatuck River and the Naugatuck River's east branch. The total length of the dikes and floodwalls along the Naugatuck River is 2370 feet, and their total length along the Naugatuck River's east branch is 1450 feet. The dikes on the Naugatuck River begin at a point immediately downstream of the east and west branch confluence.

The project also entailed straightening, deepening, and widening 5000 feet of the Naugatuck River and 4000 feet of the Naugatuck River's east branch.

Torrington - West Branch

The Torrington (West Branch) Local Protection Project is located in Torrington along the lower reach of the Naugatuck River's west branch.

In conjunction with Hall Meadow Brook Dam, this project safeguards industrial, commercial, and residential areas along the west branch of the Naugatuck River. Since its completion, the project has prevented flood damages of $25,000.

Construction of the project began in July 1959 and was completed in May 1960, costing $228,000. It is a small project, built under Section 205 of the Corps' Continuing Authorities Program. It is operated and maintained by Torrington.

The project entailed deepening and widening the west branch of the Naugatuck River channel. In addition, concrete floodwalls and stone slope protection were constructed. The project extends about 2500 feet from the Prospect Street Bridge to the confluence of the Naugatuck River's east and west branches.

Waterbury/Watertown

The Waterbury/Watertown Local Protection Project is located along the east bank of the Naugatuck River in both Waterbury and Watertown.

Acting in conjunction with the Thomaston Dam seven miles upstream, the project provides substantial protection for an industrial complex, a residential area, the Devon-Torrington Branch of the Conrail railroad, and sections of Thomaston Avenue.

Construction began in December 1960 and was completed in October 1961, costing $263,000. It is a small project, built under Section 205 of the Corps' Continuing Authorities Program. The project has prevented $8.4 million in flood damages, and is operated and maintained by the city of Waterbury and the town of Watertown.

The project consists of 1450 feet of earth dikes and 2711 feet of concrete floodwall, both constructed along the east bank, and a stoplog structure at the railroad track. Work also included channel excavation in an area upstream of the former Chase Brass Dam.

The Corps deepened and widened the West Branch of the Naugatuck River as part of its Torrington (West Branch) Local Protection Project. The project also included the construction of stone slope protection, partially covered by trees, along the riverbank.

The Waterbury Local Protection Project along the Mad River.

The project extends from the high ground east of the railroad bridge near Thomaston Avenue to the southern end of the industrial complex, about one mile north of the mouth of Hancock Brook. It covers an area of about 4515 feet.

Mad River, Waterbury (Woodtick)

Waterbury is located approximately 20 miles north of New Haven and about 25 miles southwest of Hartford.

Flooding conditions along the Mad River in the Woodtick area of Waterbury have been aggrevated by increased development in the floodplain, along with the resulting accumulation of silt and debris in the channel over the past decade.

A flood damage reduction project consisting of channel widening along two areas of the Mad River is planned for 1992. The total effected area is approximately 1470 linear feet in length. The two areas are located in the vicinity of Frost Road Bridges and near Bouffard Avenue. The estimated cost of the project is $1,900,000. The project is authorized under Section 205, Local Flood Protection, of the Corps' Continuing Authorities Program.

West River, New Haven

The West River Local Protection Project is located in the Westville section of New Haven, upstream of the crossing of Route 63 over the West River. The completed project will reduce the flood hazard and associated urban flooding along West River from Blake Street to Whalley Avenue.

Following the record flood of June 1982, the City of New Haven requested the Corps of Engineers to study the feasibility and justification of Federal participation in the construction of flood control improvements for the Westville section of the city. The study investigated a variety of measures to reduce recurring flood losses within the West River basin. The Corps of Engineers completed a preliminary investigation in August 1983 which found that further study was warranted. The more detailed study, finalized in

1985, recommended construction of a series of improvements to reduce flood losses in the West River area between Blake Street and Whalley Avenue in northwestern New Haven.

The project will consist of widening the West River as well as providing floodwalls and dikes along the West River and its tributary Wintergreen Brook. The channel work will widen 1,150 feet of the west bank and 600 feet of the east bank of the West River. Floodwalls and a dike will also be constructed along 1,000 feet of the northern bank of Wintergreen Brook. The walls will prevent waters from overtopping the banks and flooding commercial and residential areas.

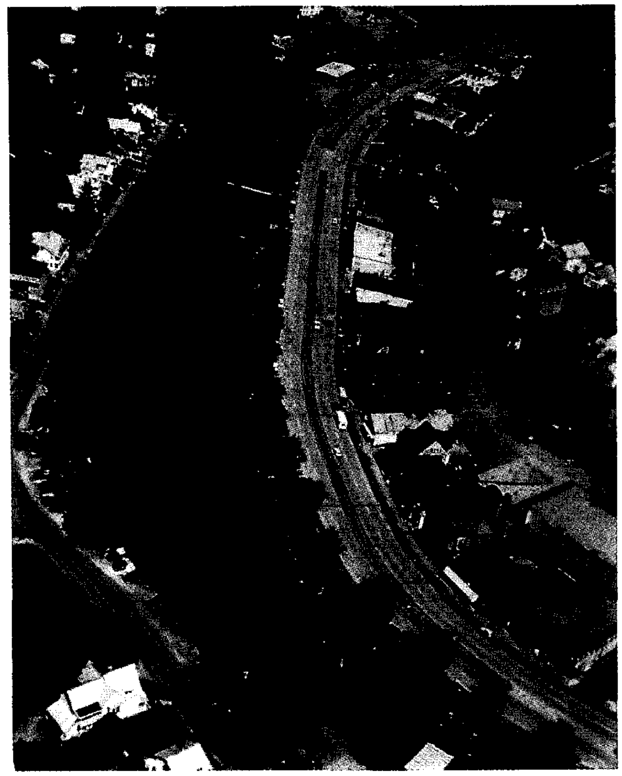
Construction of the improvements was approved by the Secretary of the Army in late September 1988. A construction contract for the amount of $3,295,000 was awarded in September 1990. The work will take approximately two years to complete.

Winsted

The Winsted Local Protection Project is situated along the lower reach of the Mad River in the Winsted section of Winchester. The project is designed to protect 73 acres of commercial, industrial, and residential property in the central part of the city. Additional protection is provided by the dam at Mad River Lake, located about one mile upstream, and Sucker Brook Dam, located about two miles to the southwest.

Construction of the Winsted Local Protection Project began in May 1950 and ended in October 1951, costing $276,000. However, in August 1955, heavy rainfall from two successive hurricanes caused extreme flooding on the Mad River, severely damaging the project. Disaster operations following the flood included clearing the river channel and removing many of the constricting foundations. The city's acquisition of adjacent land and enforcement of floodplain zoning laws has eliminated much of the congestion along the Mad River channel that existed prior to the 1955 flood.

The original work, completed in 1951, consisted of removing an abandoned dam and excavating the channel for 4890 feet from Lake Street downstream to a point about 1700 feet below the Case Street Bridge. Work done by the state following the 1955 storm included widening Main Street and building retaining walls.



The Winsted Local Protection Project involved clearing 4890 feet of the Mad River.

Navigation

The Corps has completed navigation projects at 28 different sites in Connecticut. These sites include rivers, bays, coves, and harbors that are used by commercial interests, fishermen, and the many recreational boaters that enjoy the intricate and fascinating Connecticut coastline.

Initial work on many of the projects dates back to the 19th century. However, much of the navigational work in today's waterways has been constructed by the Corps within the past 50 years, costing an aggregate total of $20 million. (More information on the navigational role of the Corps is available on page 6).

The following pages describe the Corps' navigation projects in Connecticut. Depths given for channels and anchorages are those at Mean Low Water.

Branford Harbor is a popular spot for recreational boating.

Navigation Projects in Connecticut

Black Rock Harbor

Branford Harbor

Bridgeport Harbor

Clinton Harbor

Connecticut River

Duck Island Harbor

Fivemile River Harbor

Greenwich Harbor

Guilford Harbor

Housatonic River

Mianus River

Milford Harbor

Mystic River

New Haven Harbor

New London Harbor

Niantic Bay and Harbor

Norwalk Harbor

Patchogue River

Pawcatuck River and Little Narragansett Bay

Port Chester Harbor

Southport Harbor

Stamford Harbor

Stonington Harbor

Stony Creek

Thames River

Westcott Cove

Westport Harbor and Saugatuck River

Wilson Point Harbor

Black Rock Harbor in Bridgeport.

Black Rock Harbor

Black Rock Harbor in Bridgeport is an important commercial port that serves several waterfront facilities. It is bordered on the east by Fayerweather Island.

Navigational improvements to Black Rock Harbor were made as early as 1838, when a seawall was constructed along the eastern side of Fayerweather Island. In 1899, groins were built on the east side of the harbor to prevent the shift of sediment from the shore to the navigational area.

The harbor's main feature is a 2.4-mile-long, 18-foot-deep channel that extends from Long Island Sound, through Black Rock Harbor and Cedar Creek, to the heads of the east and west branches of Cedar Creek. The channel is 200 feet wide for the first 1.75 miles, then narrows to 150 feet until the junction of the east and west branches, where it becomes 100 feet wide in each branch.

The channel was completed in 1931.

Branford Harbor

Branford Harbor lies at the mouth of the Branford River in southwestern Branford. The harbor is used chiefly for recreational boating.

The project consists of a 2.8-mile-long channel, 8.5 feet deep and 100 feet wide, extending from the outer harbor, through the Branford River, to the vicinity of the Route 146 Bridge in Branford. This work was completed in 1907.

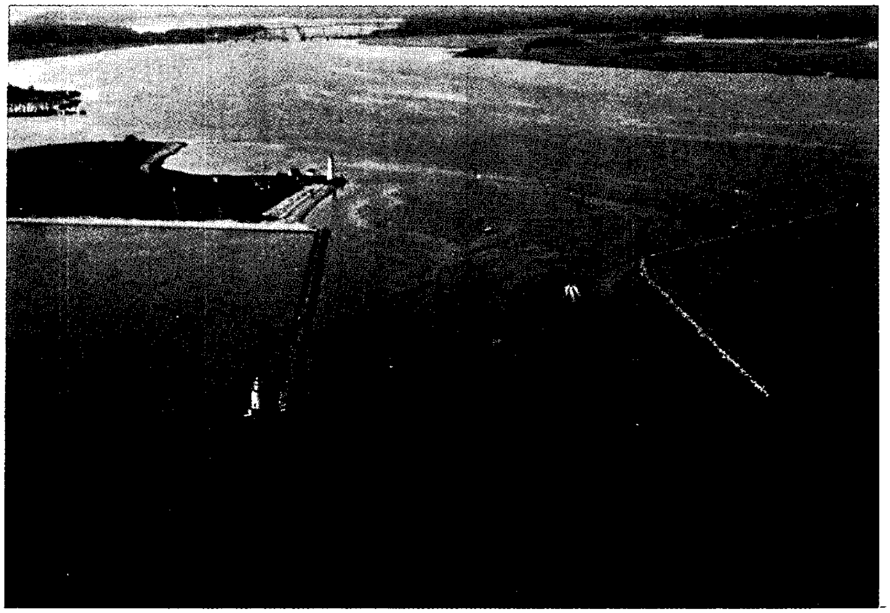
Bridgeport Harbor

Bridgeport Harbor, one of Connecticut's principal commercial ports, lies at the mouth of the Pequonnock River in southeastern Bridgeport.

The development of Bridgeport Harbor began in 1836 and has been modified several times. The harbor contains the following navigational features:

- A main ship channel extending from Long Island Sound to the inner harbor. From Long Island Sound to Tongue Point, the channel is 35 feet deep and 400 feet wide. It widens to 600 feet at the northwest bend (opposite Cilco Terminal), then narrows to 300 feet at a point 800 feet before the Stratford Avenue bridge as it heads up the Pequonnock River. The deepening of this channel to 35 feet was completed in 1963.
- Two breakwaters at the entrance to the main harbor. The easterly breakwater is 3823 feet long, and the westerly breakwater has a length of 2110 feet.
- Two anchorage areas in the upper harbor. The first, 25 feet deep and 23 acres in area, lies opposite Tongue Point (A small portion of this anchorage was dredged to 33.5 feet to facilitate the movement of large commercial ships); the second, 18 feet deep and 29 acres in area, lies on the southwesterly side of the main channel, parallel to the shoreline, directly across from Yellow Mill Channel.
- A turning basin 18 acres in area and 35 feet deep located south of the Cilco Terminal.
- A 15-foot-deep channel 200 feet wide, extending from the aforementioned turning basin up Johnsons River to a point 1700 feet below Hollisters Dam, where for 1100 feet it becomes nine feet deep and 100 feet wide until terminating at the six-foot-deep anchorage near Hollisters Dam.
- A three-acre anchorage area midway up the Johnsons River channel, nine feet deep at the lower end and six feet deep at the upper end.
- A six-foot-deep anchorage, two acres in area, at the head of the Johnsons River channel, near Hollisters Dam.
- A one-mile-long, 18-foot-deep channel, 150-200 feet wide, extending up Yellow Mill Pond Channel to a point about 360 feet from Crescent Avenue.
- A 1.1-mile-long, 18-foot-deep channel, 125 to 200 feet wide, extending from the vicinity of the Stratford Avenue Bridge, up the Pequonnock River, to a point 500 feet below the dam at Berkshire Avenue.

Bridgeport Harbor



Two stone jetties at the mouth of the Connecticut River in Old Saybrook help prevent the buildup of sediment and provide safe passageway for commercial and recreational vessels.

Clinton Harbor

Clinton Harbor is located at the mouth of the Hammonasset River in Clinton. The harbor is used chiefly for recreational boating.

The first work in Clinton Harbor was completed in 1893 and consisted of a stone dike between Cedar Island and the mainland to form a protected inner harbor. The most recent work, completed in 1950, consists of:

- A 1.1-mile-long channel, eight feet deep and 100 feet wide, extending from Long Island Sound to the wharves in Clinton;
- An anchorage area eight feet deep in the wharf area; and
- Maintenance of Cedar Island Dike.

Compo Beach

Compo Beach in Westport is situated on both the east and west sides of Cedar Point, at the entrance to the Saugatuck River.

The project was completed in two phases:

- Two 500-foot-long groins were constructed. The first groin was constructed at Hills Point on the eastern side of the beach, and the second was built on the western side of the beach. This phase was completed in December 1956.
- The beach (both sides) was widened to 100 feet by the direct placement of sand. The east side of Cedar Point is approximately 2600 feet long, while the west side is about 1100 feet long. This phase was completed in January 1959.

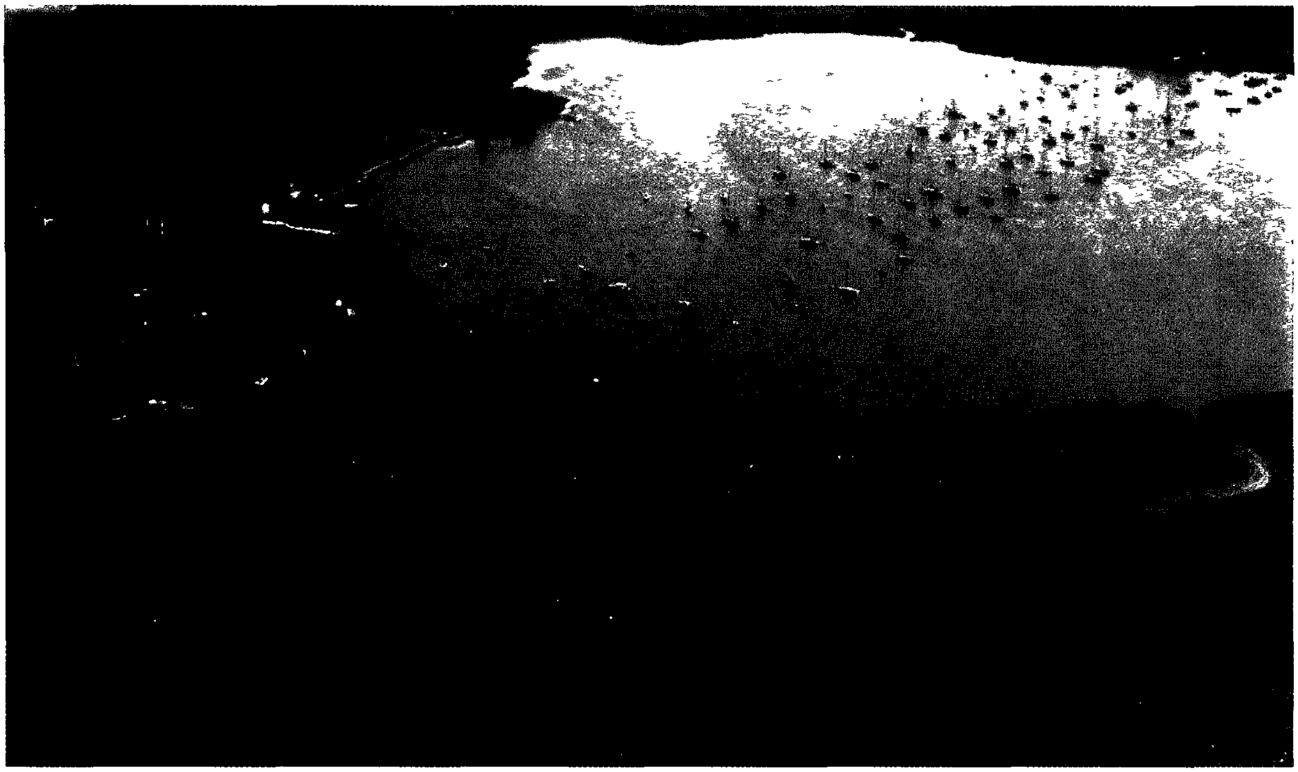
The total cost of the project was $253,600.

Connecticut River

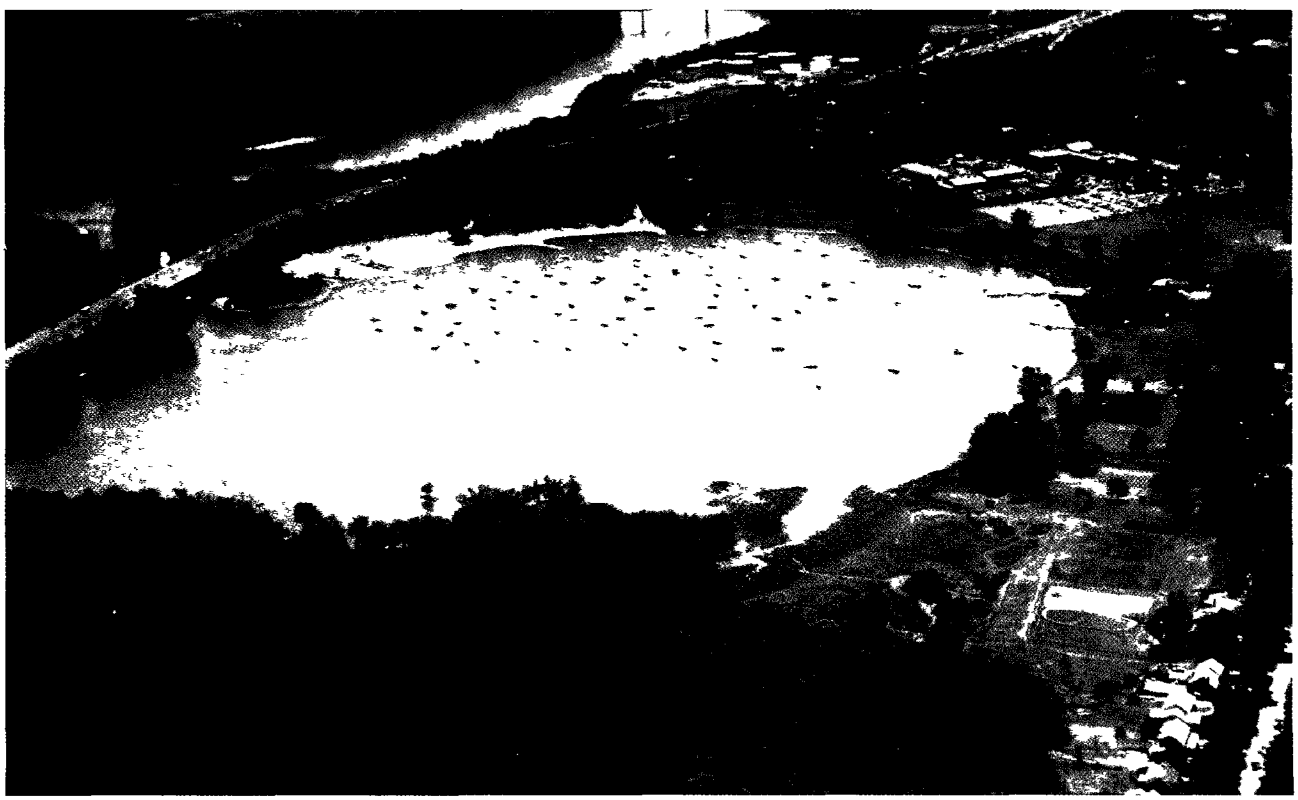
The Connecticut River is one of the state's most vital waterways. With its entrance near the eastern end of Long Island Sound, it serves (in upstream order) recreational harbors and commercial waterfronts in the communities of Old Saybrook, Old Lyme, Essex, Lyme, Deep River, Chester, East Haddam, Haddam, East Hampton, Middletown, Portland, Cromwell, Rocky Hill, Glastonbury, Wethersfield, East Hartford, and Hartford.

The first work on the Connecticut River was done in 1836 and has been modified several times. Presently, the navigational works on the river include:

- A main ship channel that stretches 52 miles upstream from the river mouth in Old Saybrook to Hartford. The depth of the channel is 15 feet. The channel width is 300 feet from the river mouth to the railroad bridge (3.4 miles). From the railroad bridge to Hartford, the channel width is 150 feet.
- Two stone jetties at the mouth of the river in Old Saybrook. The west jetty is 2750 feet long, and the east jetty is 2300 feet long.
- A channel 11 feet deep and 100 feet wide that extends 1900 feet westward from the deep water at Saybrook Shoal to North Cove, both located in Old Saybrook (mile 2).
- Two anchorage basins at North Cove. The eastern anchorage measures 11 feet deep and over 12 acres in area, and the western anchorage is six feet deep and over seven acres in area.
- A channel on Eightmile River in Lyme and a turning basin at the head of Hamburg Cove, also in Lyme (mile 9). The channel is eight feet deep and 75 feet wide and stretches 1.5 miles eastward from the Con-



North Cove in Old Saybrook



Wethersfield Cove in Wethersfield The Connecticut River is in the background necticut River to the turning basin at Hamburg Cove. The turning basin is eight feet deep, 300 feet long, and 150 feet wide.

- Training dikes, revetments, and other accessory works along the river between Sears Shoal in East Hampton (mile 24) and Hartford (mile 51).

The work described above was authorized by Congress. Under the Corps' Continuing Authorities Program, small projects can be constructed without congressional approval. Through Section 107 of this program, the Corps has constructed two small navigation projects along the Connecticut River that are chiefly used as recreational harbors. They are:

- A channel and two anchorages at the Essex waterfront (mile 7). The channel is almost one mile long, 10 feet deep, and 100 feet wide, and extends northwesterly from the Connecticut River channel at Essex Shoal, along the Essex waterfront, then back toward the Connecticut River channel. The area is bordered by two anchorage areas. The southern anchorage is 10 feet deep and over 15 acres in area, while the northern anchorage is eight feet deep and over 19 acres in area.
- A channel and anchorage basin at Wethersfield Cove in Wethersfield (mile 48). The channel is six feet deep and 60 feet wide, extending 0.4 mile westward from the Connecticut River to the anchorage basin in the southern half of the cove. The anchorage basin is six feet deep and 30 acres in area.

Duck Island Harbor

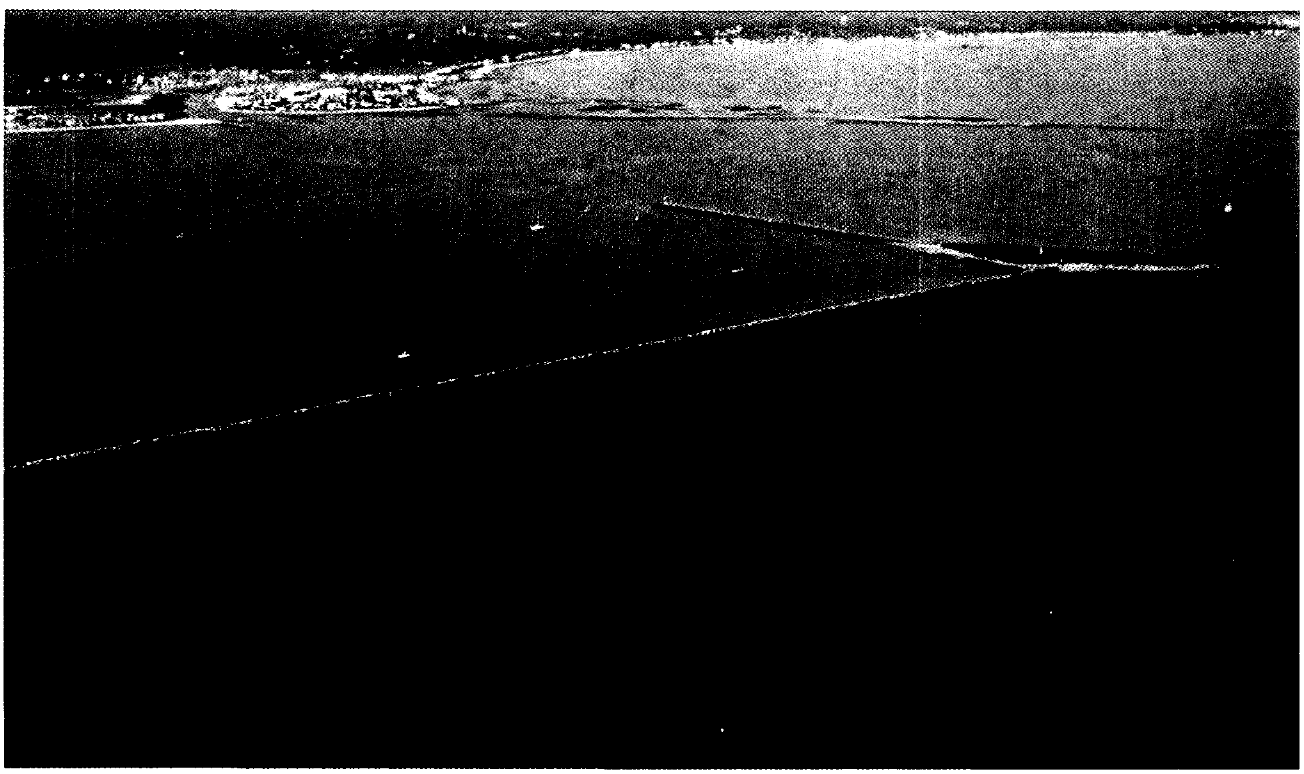
Duck Island Harbor is bounded by Clinton and Grove Beaches to the north, Duck Island to the south, Menunketesuck Island to the east, and Kelsey Point in Clinton and Stone Island to the west.

In 1899, the Corps constructed a 2700-foot-long breakwater extending westward from Duck Island. In 1917, the Corps built two additional breakwaters: a 1100-foot-long structure at the north end of Duck Island, and a 3750-foot-long breakwater extending south from Stone Island to Stone Island Reef. At the same time, the Corps also dredged a portion of an area northwest of Duck Island to a depth of 16 feet.

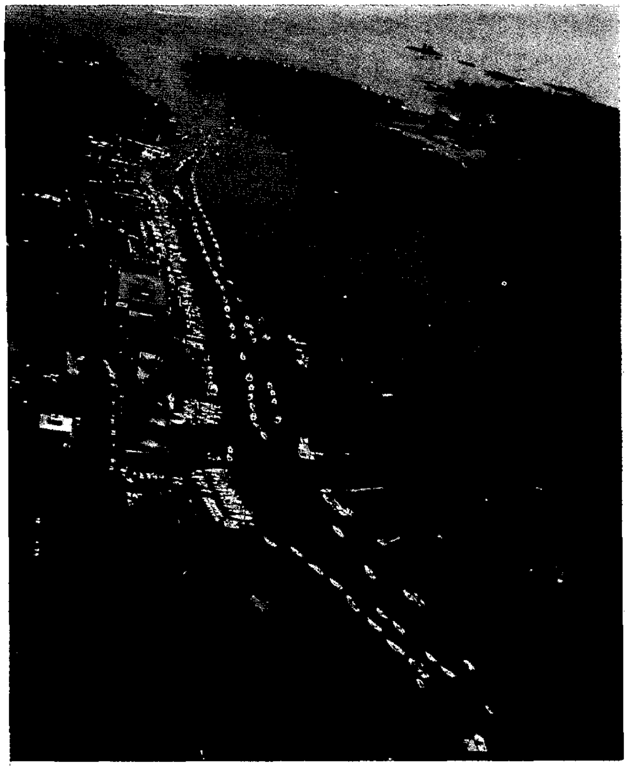
Fivemile River Harbor

Fivemile River Harbor is located at the mouth of Fivemile River along the Darien-Norwalk town line. The harbor is used chiefly for recreational boating.

The project at Fivemile River Harbor is an eight-foot-deep, 100-foot-wide channel extending almost one mile from the mouth of Fivemile River to the head of the harbor. It was completed in 1910.



The breakwaters at Duck Island Harbor in Clinton.



Fivemile River Harbor, located along the boundry between Darien and Norwalk.

Greenwich Harbor

Greenwich Harbor, located about 2.5 miles east of the New York state line in Greenwich, consists of an outer harbor and three inner coves.

Initial work in Greenwich Harbor was completed in 1905. The features of the present project, completed in 1951, include:

- A 1.4-mile-long, 12-foot deep channel. The channel is 130 feet wide from the outer harbor to the town wharf, then 100 feet wide along the wharf front to a point about 50 feet from the head of the harbor.
- An anchorage area six feet deep and about 12 acres in area north of Grass Island and west of the channel.
- An anchorage area eight feet deep and 21.5 acres in area south of Grass Island and west of the channel.

Guilford Harbor

Guilford Harbor is located at the mouth of the East River, about one mile southwest from the center of Guilford. It is used principally by fishing and recreational craft.

The project, completed in 1957, provides for:

- A 0.8-mile-long channel, six feet deep and 100 feet wide, extending from Long Island Sound, through the harbor, to the anchorage area on the East River;
- A 1500-foot-long anchorage area on the East River, six feet deep and 200 feet wide, ending at the mouth of the Neck River; and
- An 880-foot-long branch channel, six feet deep and 60 feet wide, up Sluice Creek and ending at Whitfield Street, just beyond the state wharf.

Greenwich Harbor

The Mianus River in Greenwich.

Housatonic River

The Housatonic River originates in northwestern Massachusetts and flows south for 132 miles through Massachusetts and Connecticut to Long Island Sound at Stratford, about four miles east of Bridgeport Harbor.

The Corps first began work on the Housatonic River in 1871 and has since made several improvements to facilitate navigation for commercial and recreational vessels. At present, the project consists of:

- A 13-mile-long channel stretching from the mouth of the river to Derby and Shelton. For the first five miles, from the mouth of the river to Culvers Bar in Milford, the channel is 18 feet deep and 200 feet wide. For the next eight miles, to a point about 500 feet before the Shelton-Derby Bridge, the channel is seven feet deep and 100 feet wide and used chiefly for recreational boating.
- A 5820-foot-long stone breakwater on the east side of the river mouth.
- A 1225-foot-long training dike in Stratford.
- A 163-foot-long jetty at Sow and Pigs Rock in East Derby, about 13 miles upstream from the mouth of the river.

Mianus River

The Mianus River originates in southeastern New York, flowing southerly for about 20 miles before emptying into Cos Cob Harbor in Greenwich.

The earliest work on the Mianus River was completed in 1892. The present project, completed in 1951, is a 1.2-mile-long, six-foot-deep channel, 100 feet wide, extending from Cos Cob Harbor to U.S. Route 1 (Boston Post Road) in the Mianus section of Greenwich.

Milford Harbor

Milford Harbor is located at the mouth of the Wepawaug River along the Milford shorefront. The harbor is chiefly used for recreational boating.

The first work on Milford Harbor was completed in 1874. Navigational improvements made by the Corps in intermittent years include:

- A one-mile channel stretching from the lower harbor to a point 400 feet above Town Wharf. From the lower harbor to Merwins Wharf (0.4 mile), the channel is 10 feet deep and 100 feet wide; from Merwins Wharf to the area 400 feet above Town Wharf, the channel is eight feet deep and 100-125 feet wide.
- An anchorage area, called East Basin, located on the east side of the channel at the bend. It is eight feet deep and five acres in area.
- Two adjacent anchorage areas totalling 2000 feet in length that lie parallel to the channel on its westerly side. The anchorage area closest to the outer harbor is 10 feet deep and 600 feet long, while the second anchorage is eight feet deep and about 1400 feet long.
- Two jetties in the inner harbor, close to the entrance of the Wepawaug River. The east jetty (Long Jetty) is 510 feet long, and the west jetty (Burns Point Jetty) is 250 feet long.

Mystic River

The Mystic River extends from Mystic Harbor in Mystic six miles upstream to Old Mystic. Both Mystic and Old Mystic are sections of Stonington.

The river is mainly used by fishing and recreational craft. A popular attraction is Mystic Seaport, a reconstructed seacoast village depicting 19th century waterfront development.

Work on the Mystic River began in 1890; several improvements have been made then. Navigational work the Corps has completed in the river include:

- A 3.75-mile-long channel stretching from Fishers Island Sound to a point 700 feet above the wharf at the Mystic Seaport Marine Historical Association. The channel has varying dimensions. It is 15 feet deep and 125 feet wide beginning in Fishers Island Sound, extending north along the Noank waterfront in Groton, continuing between Sixpenny and Mason Island in Stonington to Murphy Point in Mystic (2.4 miles). From Murphy Point to the U.S. Route 1 Bridge at Mystic (0.55 miles), the channel is 15 feet deep and 100 feet wide. From the bridge to the point 700 feet above the Mystic Seaport Marine Historical Association Wharf (0.8 mile), the channel is 12 feet deep and 80-90 feet wide.

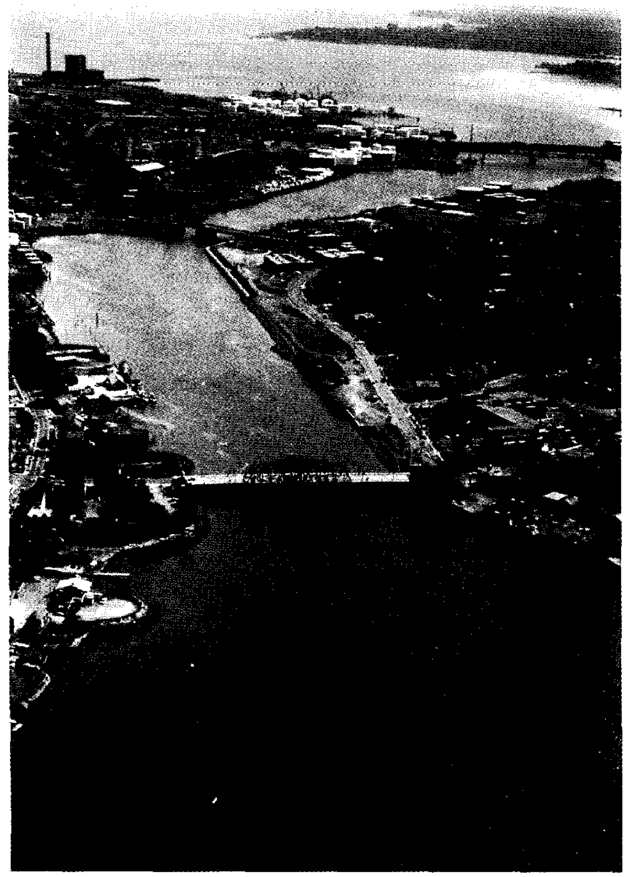
- An anchorage basin nine feet deep and 8.5 acres in area on the east side of the channel and north of Mason Island.
- A turning basin nine feet deep, 200 feet wide, and 200 feet long immediately north of the railroad bridge and west of the channel.

New Haven Harbor

New Haven Harbor, a major commercial harbor in Connecticut, extends for five miles from Long Island Sound to New Haven. West Haven and East Haven lie on either side of the outer harbor. Principal rivers flowing into the harbor are the Quinnipiac River to the northeast, the Mill River to the north, and the West River to the west.

The Corps began work on New Haven Harbor in 1852 and completed several improvements in 1950. Presently, the project consists of:

- Three breakwaters that shelter the harbor entrance. The east breakwater, located on the east side of the channel, is 3450 feet long; the middle breakwater, located on the west side of the channel, is 4450 feet long; and the west breakwater is 4200 feet long. From Morgan Point in East Haven, the breakwaters stretch southwesterly across the outer harbor in a rough diagonal shape. They were constructed in 1915.
- A five-mile-long main channel 35 feet deep and 400-800 feet wide extending from Long Island Sound to the head of the harbor, immediately south of the US Route 1 and Connecticut Turnpike Bridges.
- An anchorage basin 16 feet deep and 13.5 acres in area on the west side of the upper harbor.
- An anchorage basin 15 feet deep and 3.2 acres in area at the northwest side of the head of the harbor, opposite City Wharf.
- A 1.5-mile-long, 12-foot-deep channel extending from the 16-foot anchorage, through the mouth of the West River, to a point about 700 feet from the Connecticut Turnpike. From the 16-foot anchorage to the Kimberly Avenue Bridge, the channel is 100-150 feet wide. From the Kimberly Avenue Bridge to the point about 700 feet from the Connecticut Turnpike, the channel is 75 feet wide.
- A small-boat anchorage, six feet deep and over 1.5 acres in area, on the southwest side of the mouth of the West River.
- A 300-foot-long stub channel, 12 feet deep and 100 feet wide, extending northwest from the 15-foot-deep anchorage toward Brewery Street. Construction of the channel beyond 300 feet was abandoned when Congress declared the area unnavigable in 1949.



New Haven Harbor

- A 12-foot-deep channel up the Mill River that splits into two branches. The channel is 2000 feet long and 200 feet wide up to the junction of the two branches. The east branch is 1200 feet long and 100 feet wide, while the west branch is 1600 feet long and 125 feet wide. The channels in each branch extend to the Grand Avenue Bridge.
- A 200-foot-wide channel in the lower reaches of the Quinnipiac River, 18 feet deep in the 3700-foot reach between the Tomlinson (U.S. Route 1) and Ferry Street Bridges, and 16 feet deep in the 3000-foot reach extending upstream to the Grand Avenue Bridge.
- A 4200-foot-long training dike at Sandy Point in West Haven, opposite the Fort Hale Bar.

The Corps also removed rocks in Morris Cove, on the east side of the outer harbor near the Brightview section of East Haven, to facilitate navigation.

New London Harbor

New London Harbor

New London Harbor, located in the New London business district, is about three miles upstream from Long Island Sound and about 12 miles west of the Rhode Island state line.

Corps work in New London Harbor began in 1880, and in 1938, several modifications were completed. These include:

- A 3.8-mile-long main ship channel, 40 feet deep, and 600 feet wide, stretching from Long Island Sound to the State Pier at the northern end of the harbor, close to the US Route 95 Bridge. The deepening of the channel to 40 feet from its previous depth of 33 feet was completed in 1976 by the Department of the Navy. The Corps is responsible for maintaining the channel 40 feet deep and 500 feet wide.
- A waterfront channel 6000 feet long, 23 feet deep, and a minimum of 400 feet wide. This channel stems from the main channel and provides access to the city's waterfront, including the Fort Trumbull, Shaw Cove, and the main pier areas. It splits into two branch channels at the State Pier.
- Two branch channels, each 23 feet deep. The east channel, between the State Pier and the Central Vermont Railroad Pier, is 100 feet wide and 1000 feet long. The west channel, between the Central Vermont Railroad Pier and the New London shoreline (Winthrop Cove), is 250 feet wide and 1500 feet long.
- A maneuvering area 23 feet deep located west of the waterfront channel and south of State Pier.
- An anchorage basin 15 feet deep in Shaws Cove.

Niantic Bay Harbor

Niantic Bay is a wide, shallow bay at the mouth of the Niantic River. The river forms a partial boundary between East Lyme and Waterford.

The harbor is protected by a large bar that serves as a causeway for the Conrail railroad and Route 156. It is a popular place for harvesting scallops and is used by a large fleet of recreational and sportfishing boats.

The project consists of a channel with varying dimensions. An eight-foot deep, 100-foot wide entrance channel extends about 1700 feet northeasterly from deep water at the northeastern end of Niantic Bay to the railroad and highway bridges, where it narrows as it passes under at the southern end of Niantic Harbor. The channel then becomes six feet deep and 100 feet wide as it extends in a zig-zag pattern about 8500 feet upstream to the deep water south of Sandy Point.

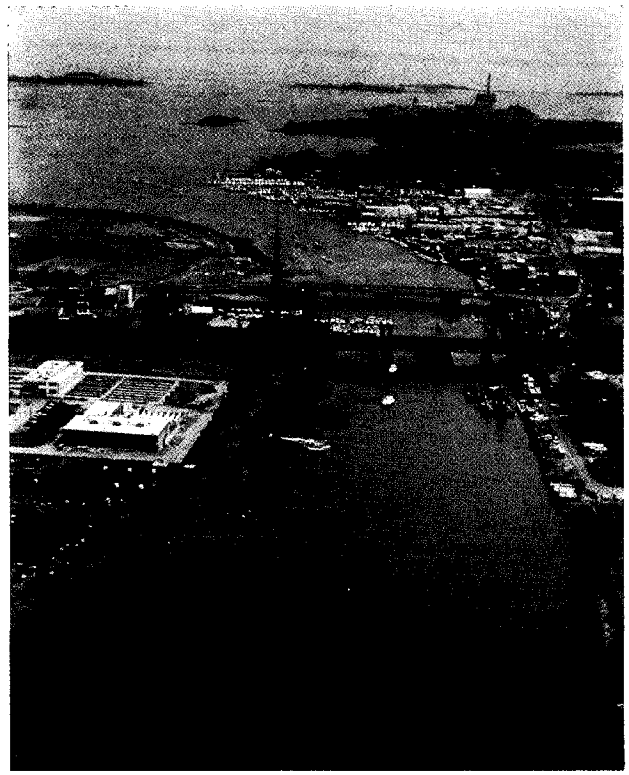
The channel at Niantic Bay and Harbor was completed in August 1970 as a small project under Section 107 of the Corps' Continuing Authorities Program.

Norwalk Harbor

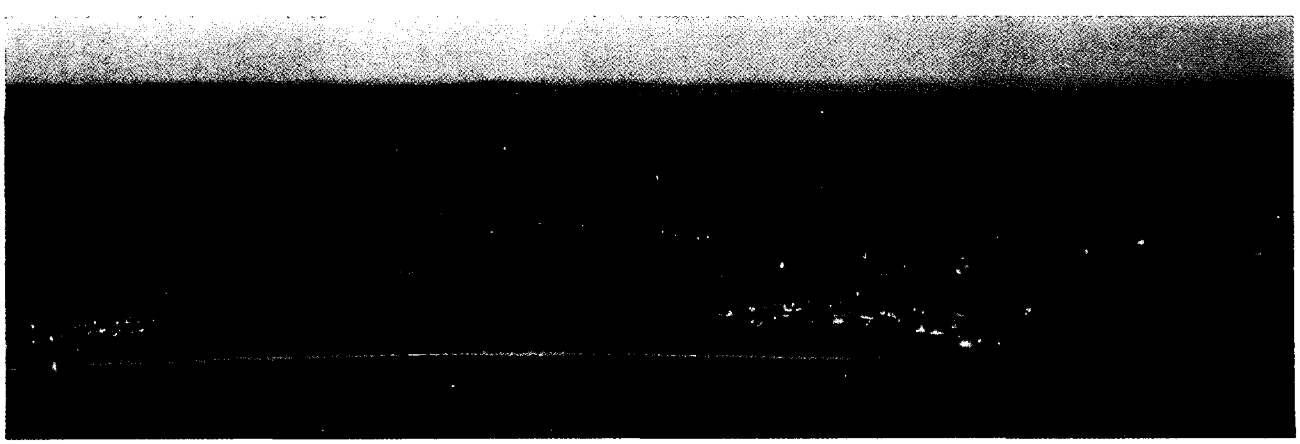
Norwalk Harbor is located at the mouth of the Norwalk River, about eight miles east of Stamford. It forms a boundary between the East and South Norwalk sections of the city.

Corps work on Norwalk Harbor began in 1872. Features of the existing project, completed in 1950, are:

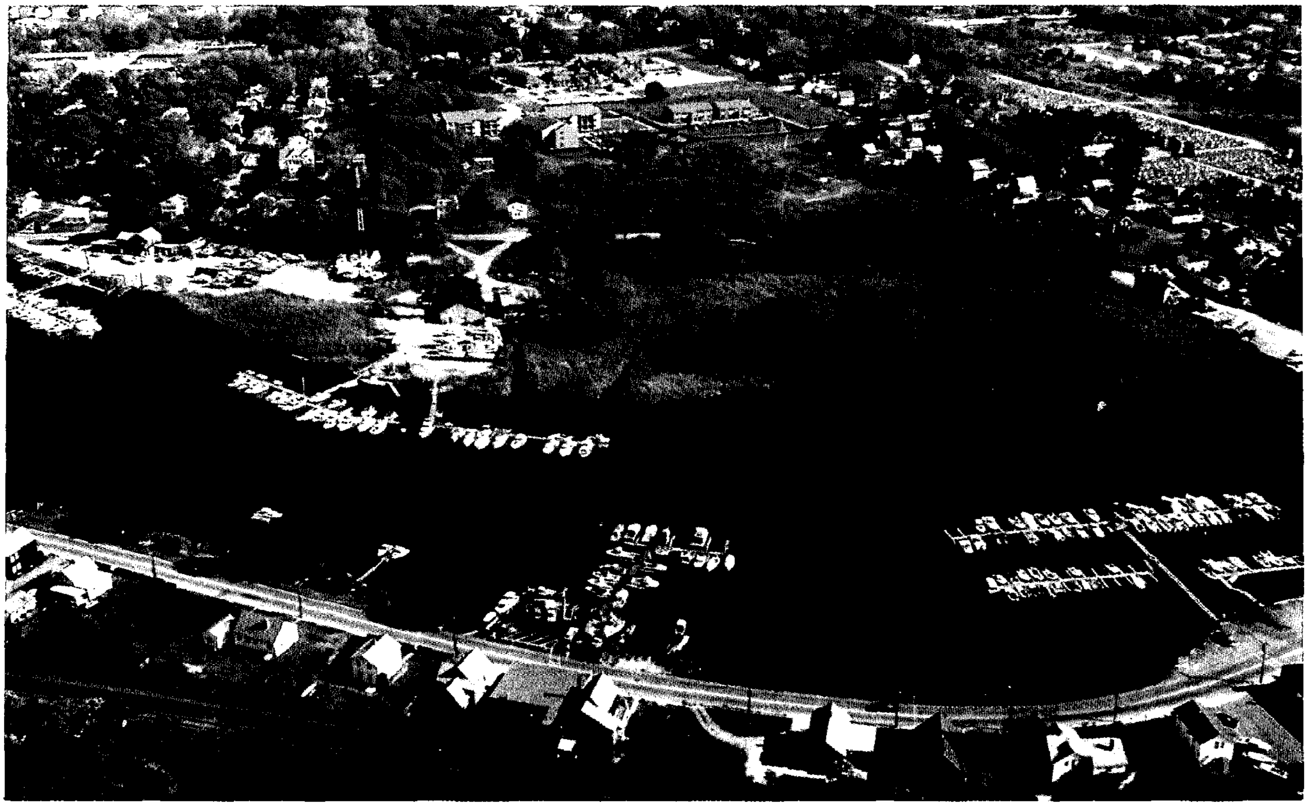
- A 4.7-mile-long channel extending from the outer harbor to the head of the harbor in Norwalk. The channel is 12 feet deep and 200 feet wide from the outer harbor to Gregory Point in East Norwalk, where it narrows to 150 feet wide up to the wharves at South Norwalk. The channel then widens to 250 feet along the wharves to the Washington Street Bridge. For its final 1.5 miles, the channel is 10 feet deep and between 100-200 feet wide until it terminates at the head of the harbor in Norwalk.
- An anchorage area 10 feet deep and 17 acres in area on the east side of the channel in the vicinity of Fitch Point in East Norwalk.
- A 0.6-mile-long, six-foot-deep channel, 125-150 feet wide, extending northeast from the 10-foot anchorage opposite Fitch Point to the head of the harbor at East Norwalk.
- A six-foot-deep anchorage area that lies adjacent to the head of the harbor at East Norwalk.



Norwalk Harbor



Niantic Bay and Harbor, on the border of East Lyme and Waterford.



The Pawcatuck River, looking from Stonington to Westerly, Rhode Island.

Patchogue River

The Patchogue River starts at the northeastern end of Duck Island Roads and flows for three miles through Westbrook. The river is used chiefly by recreational and fishing boats.

Navigational improvements to the Patchogue River were completed in 1956. They consist of:

- A one-mile-long, eight-foot-deep channel extending from Duck Island Harbor to the U.S. Route 1 Bridge. The channel is 125 feet wide from Duck Island Harbor to the junction of the Patchogue and Menunketesuck Rivers (1800 feet), where it becomes 75 feet wide until its ends at the U.S. Route 1 Bridge. The enlargement of the 1800-foot section of the channel from its original width of 75 feet to 125 feet was completed in 1984 as a small project under Section 107 of the Corps' Continuing Authorities Program.
- An anchorage and maneuvering area eight feet deep, 75 feet wide, and 500 feet long opposite the town wharf, about 0.4 mile below the highway bridge.
- A sandtight stone jetty extending 600 feet south into Duck Island Roads from the mouth of the Menunketesuck River.

Pawcatuck River and Little Narragansett Bay

The Pawcatuck River flows through the east side of the Pawcatuck section of Stonington into Little Narragansett Bay at the Rhode Island-Connecticut state line.

Corps work on the Pawcatuck River began in 1871. Presently, the navigational features of the river are:

- A 7.5-mile-long, 10-foot-deep channel extending from Stonington Point, located on the bay's western end, through Little Narragansett Bay and up the Pawcatuck River to Westerly, Rhode Island. The channel is 200 feet wide from Stonington Point to the lower wharves at Westerly (about seven miles), then to 40 feet to the upper wharves.
- A 0.28 mile-long, 10-foot-deep, 100-foot-wide channel extending from the mouth of the Pawcatuck River into Watch Hill Cove in Westerly.
- A 10-foot-deep anchorage basin in Watch Hill Cove.
- A 550-foot-long jetty constructed near Watch Hill Cove.

Port Chester Harbor in Greenwich.

Port Chester Harbor

Although officially located in the Port Chester section of Rye, New York, Port Chester Harbor is situated on the Byram River, which forms a partial boundary between New York and Connecticut.

The existing project, completed in 1938, provides for:

- A 1.7-mile-long channel extending from Long Island Sound to a point 100 feet below the fixed bridge at Mill Street in Port Chester. From Long Island Sound to the mouth of the Byram River at the southerly point of Fox Island, the channel is 12 feet deep and 150 feet wide. From the mouth of the river to a point 900 feet below the fixed bridge at Mill Street, the channel is 10 feet deep and 100 feet wide. For the next 800 feet, the channel measures three feet deep and 175-100 feet wide.
- An anchorage basin 12 feet deep at Byram Point.

The maintenance of Port Chester Harbor is under the jurisdiction of the New York District of the Corps of Engineers.

Southport Harbor

Southport Harbor is located at the mouth of the Mill River in Fairfield. The harbor is used primarily for recreational boating.

Corps work on Southport Harbor began in 1829 and has since undergone several modifications. The project presently consists of:

- A 1.1-mile-long, nine-foot-deep channel extending from Long Island Sound to Golf Club Wharf. From Long Island Sound to East Main Street, the channel is 100 feet wide. From East Main Street to Golf Club Wharf, the channel varies in width between 175-400 feet.
- A six-foot-deep anchorage area north of Golf Club Wharf, 300 feet wide and 500 feet long.
- A 1320-foot-long stone breakwater on the east side of the harbor entrance.
- A 1350-foot-long training dike along the east bank of the river.

Southport Harbor in Fairfield.

Stamford Harbor

Stamford Harbor

Stamford Harbor is located in southwestern Stamford, about seven miles east of the New York state line. The inner harbor splits into two branches: the west branch, which ends at the mouth of the Rippowam River, and the east branch, which passes through the Stamford Hurricane Protection Barrier and ends about 0.75 mile upstream.

Initial work in Stamford Harbor was completed by the Corps in 1886. Since 1919, the harbor has undergone several modifications. Presently, the navigational features of Stamford Harbor include:

- Two breakwaters located at the entrance of the harbor on either side of the channel. The east breakwater is 1200 feet long, and the west breakwater is 2900 feet long.
- A one-mile-long, 200-foot-wide main channel extending from the outer harbor to the inner harbor, where it divides into the east and west branches. The main channel is 18 feet deep for the one-half mile between the outer harbor and the upper end of the 18-foot-deep anchorage located on the channel's west side. It then becomes 15 feet deep to the junction of the east and west branches.
- An anchorage basin 18 feet deep and 19 acres in area on the main channel's west side, inside the west breakwater.
- The one-mile-long west branch channel, 15 feet deep and 125 feet wide. The channel leads into a large, 15-foot-deep maneuvering basin, 380 feet wide, at the mouth of the Rippowam River.
- The 1.5-mile-long east branch channel, 12 feet deep and between 100-150 feet wide, which passes through the navigation gates of the Stamford Hurricane Protection Barrier and ends upstream in Stamford.

Stonington Harbor

Stonington Harbor is situated west of Stonington on the north shore of Fishers Island Sound. Famous in the early 19th century as the home port for many worldwide whaling and sealing expeditions, the harbor is now chiefly a fishing port.

Navigational work in the harbor was first completed by the Corps in 1828. The most recent modifications were completed in 1957. The main navigational features of Stonington Harbor are:

- Two breakwaters; one off Wamphassuck Point on the west side of the outer harbor, and the second at Bartlett Reef on the east side of the outer harbor, 0.8 mile south of Stonington Point.
- A 12-foot-deep basin near the middle of the inner harbor.
- A dredged portion of Penguin Shoal to a depth of 10 feet. Penguin Shoal is located at the southwest end of the inner harbor, near Wamphassuck Point.

Stony Creek

The cove at Stony Creek in Branford is located about three miles east of Branford Harbor. Stony Creek is used by recreational boats, the local fishing fleet, charter boats, and a ferry that runs to the Thimble Islands, a group of over 30 small islands lying about a mile offshore.

The project at Stony Creek consists of:

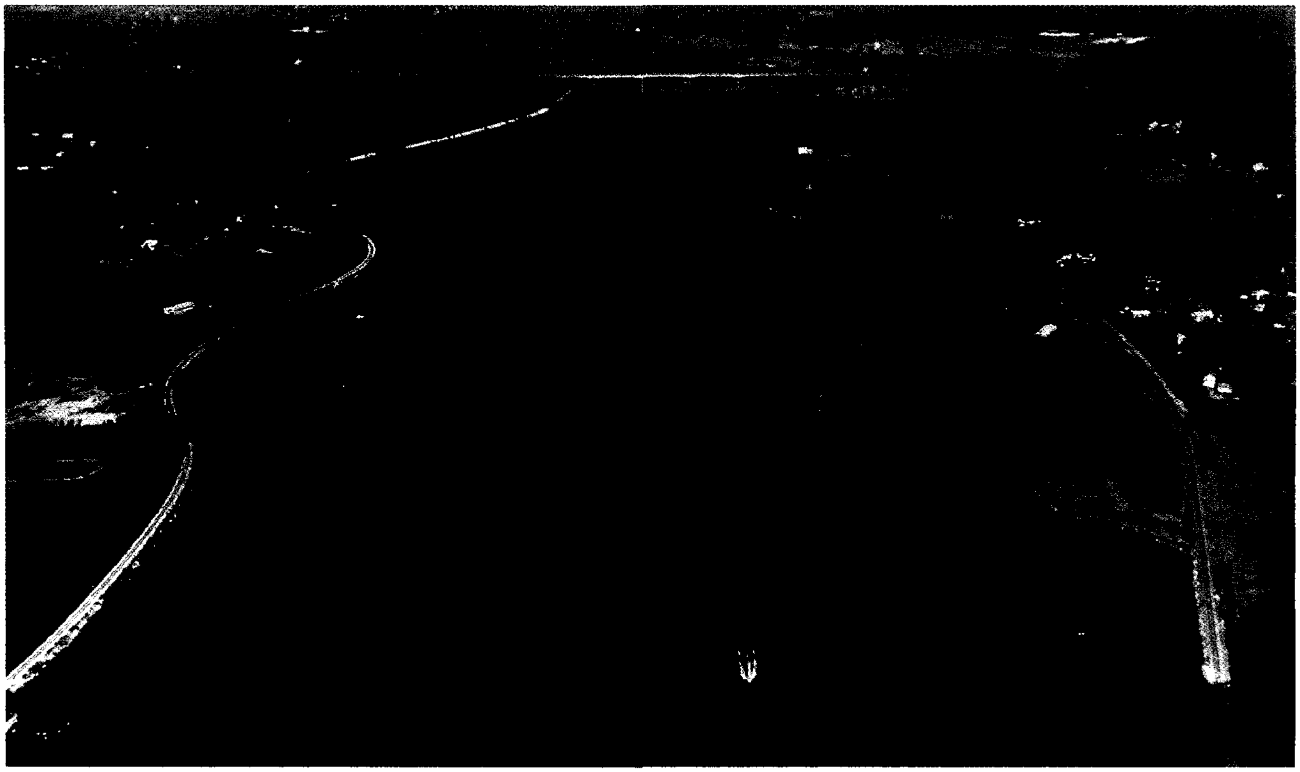
- A channel six feet deep and 100 feet wide. It begins in Long Island Sound, passes 75 feet off the town dock, and ends at a point 800 feet north of the town dock.
- A 3.5-acre maneuvering basin, six feet deep and 200 feet wide, located at the head of the channel's east side.

The project was completed in January 1970 as small project under Section 107 of the Corps' Continuing Authorities Program.

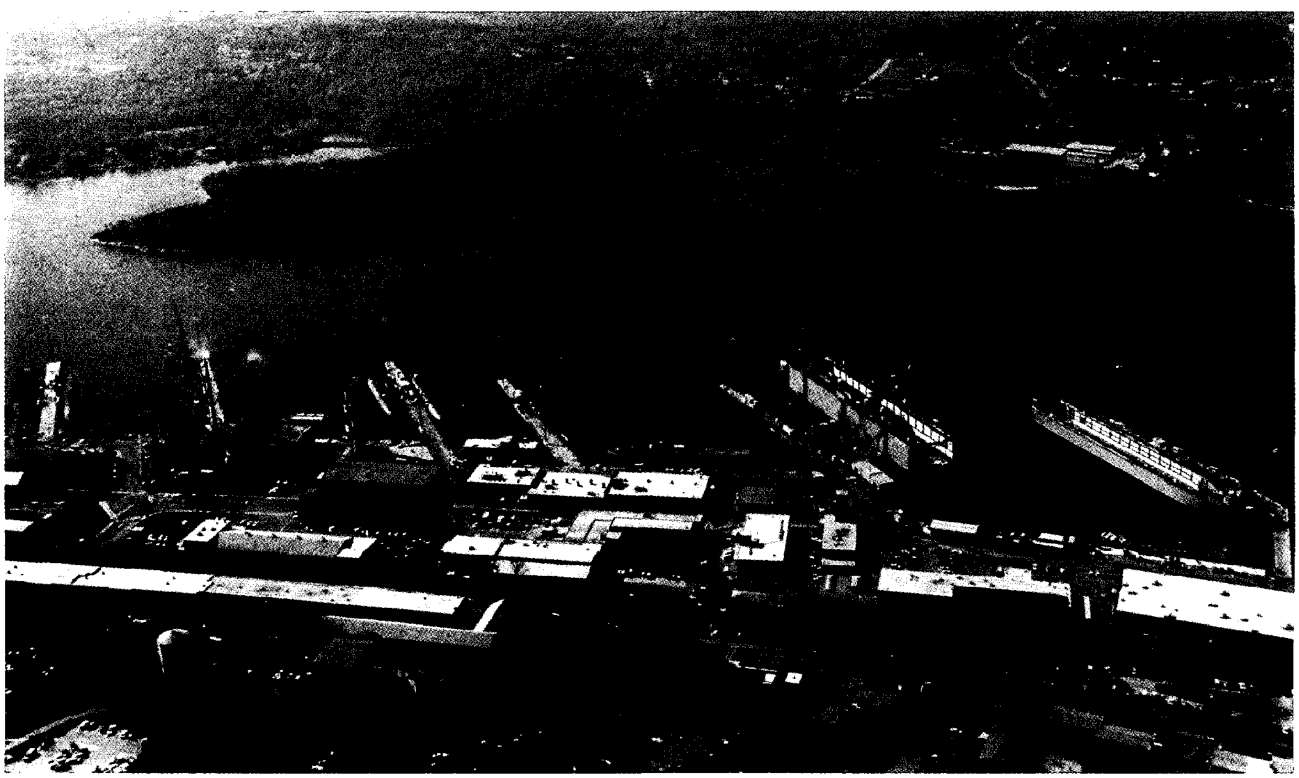
Thames River

The Thames River is formed by the confluence of the Shetucket and Yantic Rivers in Norwich and flows south for 12 miles to New London Harbor. It serves (in upstream order) commercial and recreational waterfronts in the communities of New London, Groton, Waterford, Ledyard, Montville, and Norwich.

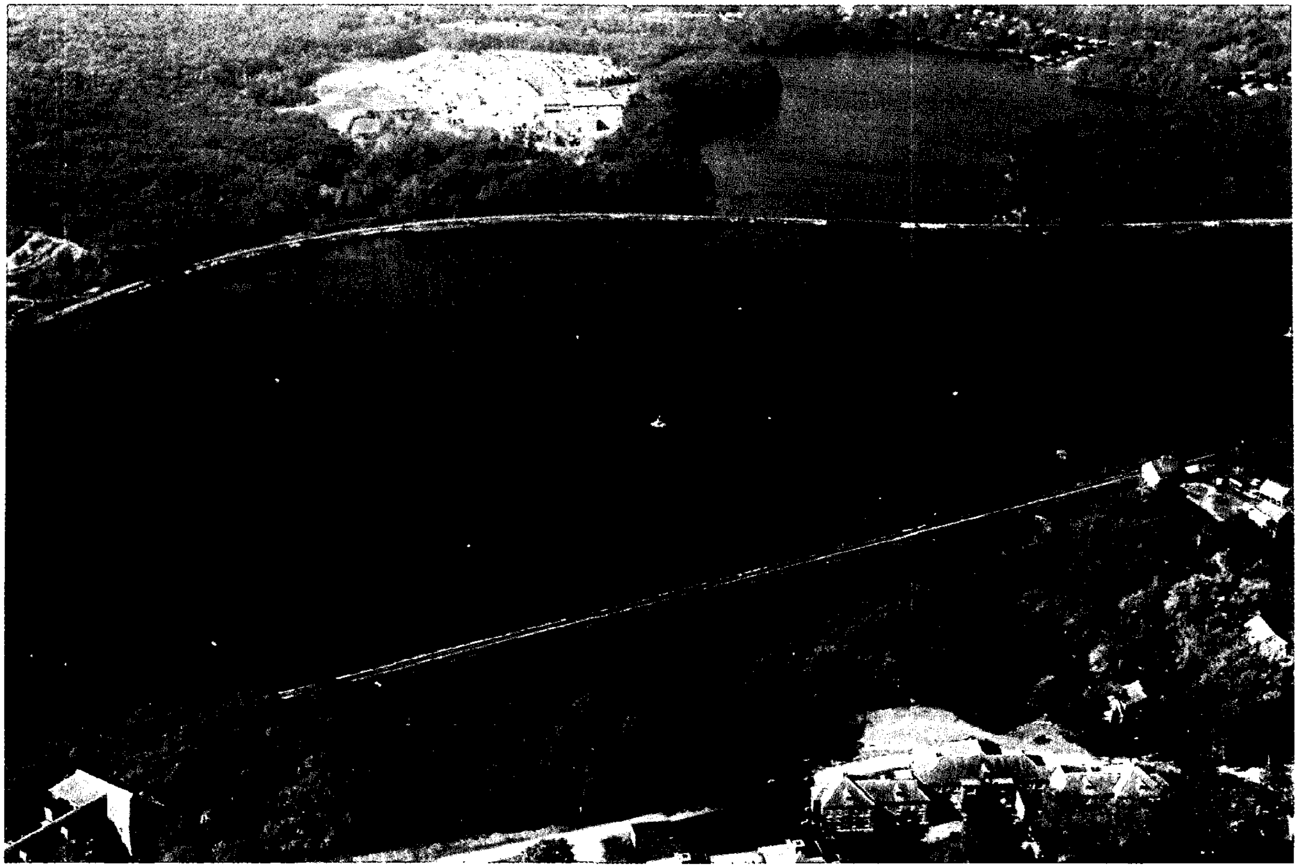
The earliest work on the Thames River was completed by the Corps in 1836 and modified in 1879. This work in-



The Thames River. Ledyard is on the right and Montville is on the left. Mohegan Dike can be seen on the lower right. Route 2A is in the background.



The Thames River in Groton. The U.S. Naval Submarine Base is in the foreground.



The Thames River, with Trading Cove and Trading Cove Dike in the background, in Norwich.

cluded dredging and deepening the river channel and constructing several piers. The most recent work on the river, completed in 1942, provides for:

- A 25-foot-deep channel, about 10.5 miles long, extending from the area east of Mamacoke Cove in New London (almost two miles north of the New London Highway Bridge) to Norwich, at the mouth of the Shetucket River. The channel is 250 feet wide from Mamacoke Cove to Bartlett Crossover (about four miles upstream of the New London Highway Bridge), then 200 feet wide from Bartlett Crossover to Norwich. (In 1980, the Department of the Navy deepened a portion of this channel to 36 feet. The new depth begins at the US Route 95 Bridge and extends to the upstream end of the U.S. Naval Submarine Base in Groton. The Corps is responsible for maintaining this part of the channel to a depth of 36 feet and a width of 250 feet).
- Widening the channel opposite the U.S. Naval Submarine Base from 250 to 350 feet, with the widened area having a depth of 20 feet. This work was completed by the Department of the Navy in 1940.
- Five training dikes in the upper three miles of the river that help keep sediment from settling at the bottom of the channel. These dikes are:
  - –Norwich Dike.............. 1050 feet long
  - –Rolling Mill Dike......... 3480 feet long
  - –Long Rock Dike........... 2800 feet long
  - –Trading Cove Dike ..... 2370 feet long
  - –Mohegan Dike............. 2990 feet long
- The removal of obstructions at the mouth of the Shetucket River.

Westcott Cove

Westcott Cove in Stamford is located one mile east of Stamford Harbor. It is separated from the harbor by Shippan Point. The waterway is used chiefly for recreational boating.

The project at Westcott Cove was completed in 1963. It consists of a 0.8-mile-long channel, eight feet deep and 100 feet wide, stretching from Westcott Cove to the municipal lagoon in Cummings Park.

Westport Harbor and Saugatuck River

The Saugatuck River flows through Westport Harbor and empties into Long Island Sound at the southwestern end of Westport. The river is navigable from its mouth at the Saugatuck section of Westport to the U.S. Route 1 Bridge in Westport, a distance of 4.2 miles. A large recreational fleet is based in the many coves along the river.

The main navigational feature of the Westport Harbor/ Saugatuck River area is a four-foot-deep channel that extends from the highway bridge at Saugatuck to Westport Harbor, where it divides into two smaller, stub channels, also four feet deep. The left stub channel has a width of 54 feet, and the right channel has a width of 40 feet. These channels were constructed in 1896.

To facilitate navigation, the Corps in 1898 removed boulders in the channel area between the Connecticut Turnpike Bridge and Westport Harbor. The Corps removed ledge rock opposite Stony Point in 1908. Repairs to a previously constructed breakwater at Cedar Point were made in 1897.

Wilson Point Harbor

The harbor at Wilson Point is located in Norwalk. A small recreational fleet is based at facilities along the harbor.

The project, completed by the Corps in 1892, consists of a 0.7-mile-long, 15-foot-deep channel extending from Sheffield Island Harbor east of Bell Island to an area west of the wharves at Wilson Point. For 2000 feet, beginning at Sheffield Island Harbor, the channel is 700 feet wide. For the next 750 feet, the channel width extends to 900 feet. The width of the channel then narrows to 200 feet, with the channel turning west of the former commercial wharves at Wilson Point for the final 1000 feet.

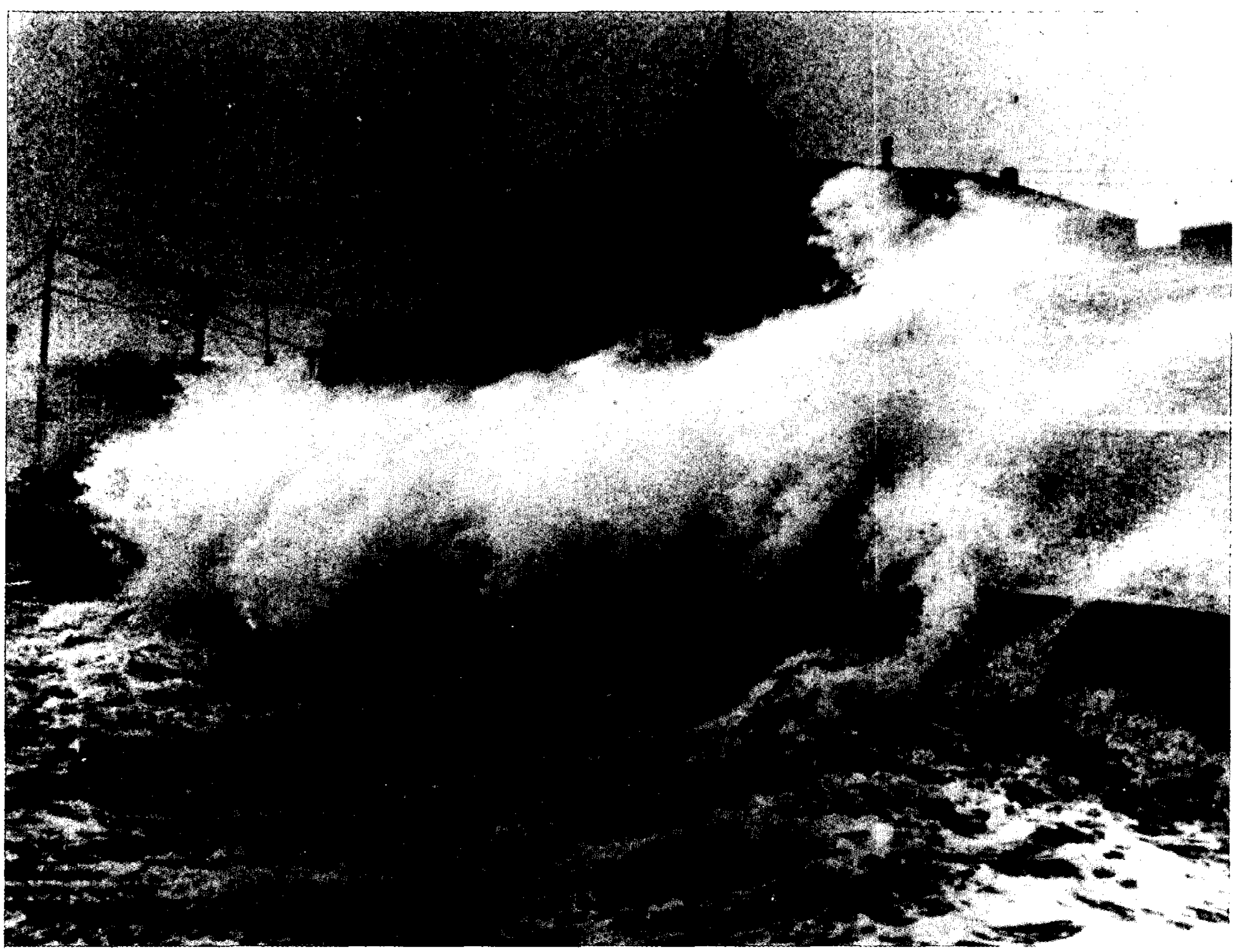
Westcott Cove in Stamford.

Shore and Bank Protection

The Corps has constructed 25 shore and bank protection projects in Connecticut to stem erosion of the shoreline and inland riverbanks. Twenty-one of these projects were built on the shore, while four were constructed on inland streambanks. Total construction costs amounted to more than $6 million.

The Connecticut coastline is approximately 270 miles long. About 215 miles are privately owned, while 50 miles are owned by the state and five are owned by the federal government. The state has approximately 8400 miles of rivers and streams, second in New England only to Maine's 31,672.

The following pages describe the Corps' shore and bank protection projects in Connecticut.



The shore can take a beating from storm driven winds and waves. In September 1961, Hurricane Esther raised havoc with Rhode Island's Narragansett Pier, slamming waves against the seawall and flooding adjacent streets. (Copyright 1961 The Providence Journal Company*).*

Shore and Bank Protection Projects in Connecticut

Burial Hill Beach

Calf Pasture Beach

Compo Beach

Cove Island

Cummings Park

Guilford Point Beach

Gulf Beach

Gulf Street

Hammonasset Beach

Housatonic River, Salisbury

Jennings Beach and Ash Creek

Lighthouse Point Park

Middle Beach

Nonewaug River, Woodbury

Port V Facility, Bridgeport

Prospect Beach

Sasco Hill Beach

Salmon River, Colchester

Seaside Park

Sherwood Island State Park

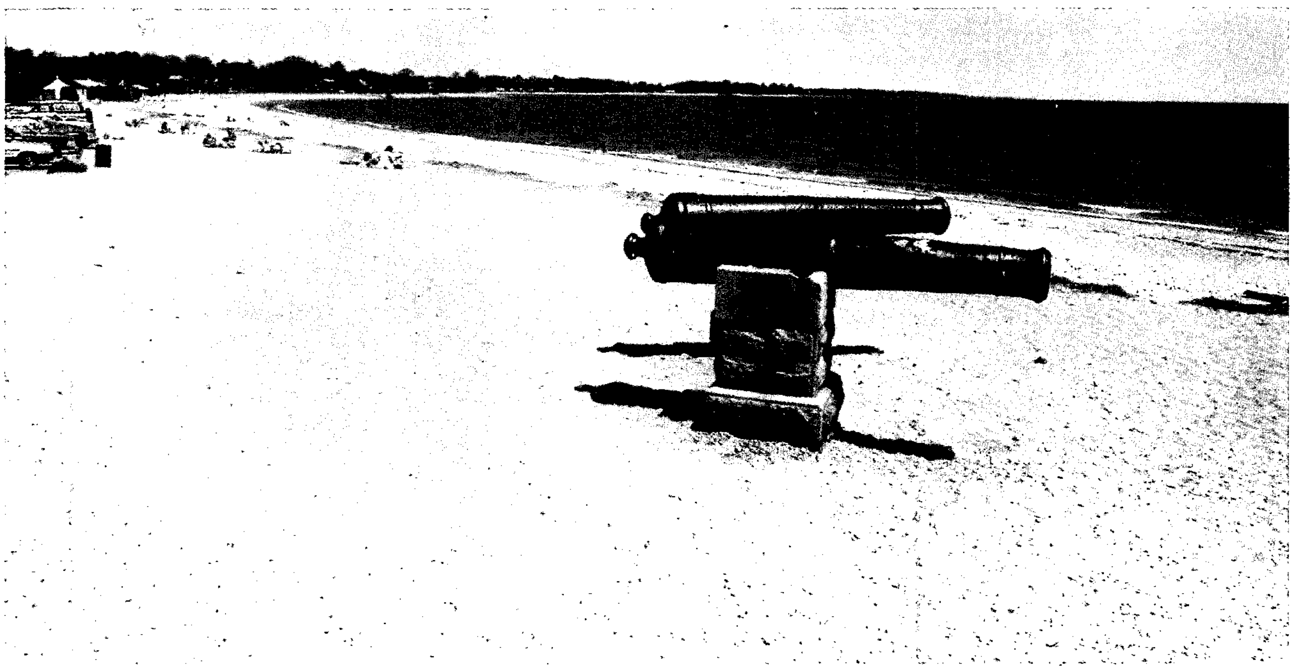
Short Beach

Silver Beach to Cedar Beach

Squantz Pond, New Fairfield

Southport Beach

Woodmont Shore



Compo Beach in Westport.

Burial Hill Beach

Burial Hill Beach in Westport lies immediately east of Sherwood Island State Park, between Sherwood Point and Frost Point.

About 500 feet of Burial Hill Beach was widened to 100 feet by the direct placement of sand. The project was completed in June 1957 at a cost of $17,400.

Calf Pasture Beach

Calf Pasture Beach in Norwalk is located on the east side of Calf Pasture Point at the entrance to Norwalk Harbor.

The beach erosion control project at Calf Pasture Beach has two components:

- In October 1958, two existing groins were lengthened to 400 feet.
- In December 1958, approximately 2200 feet of Calf Pasture Beach was widened to 125 feet by the direct placement of sand.

The cost of the project was $176,500.

Compo Beach

Compo Beach in Westport is situated on both the east and west sides of Cedar Point, at the entrance to the Saugatuck River.

The project was completed in two phases:

- Two 500-foot-long groins were constructed. The first groin was constructed at Hills Point on the eastern side of the beach, and the second was built on the western side of the beach. This phase was completed in December 1956.
- The beach (both sides) was widened to 100 feet by the direct placement of sand. The east side of Cedar Point is approximately 2600 feet long, while the west side is about 1100 feet long. This phase was completed in January 1959.

The total cost of the project was $253,600.

Cove Island

Cove Island lies at the head of Cove Harbor in southeastern Stamford. The beach is situated on the eastern shore of the island.

The project provided for widening approximately 1200 feet of beach to a width of 125 feet by the direct placement of sand. A 400-foot-long jetty was also constructed at the far northeastern end of the beach.

Construction was completed in September 1958. The project cost $141,400.

Cummings Park

Cummings Park is located at the head of Westcott Cove in eastern Stamford.

The beach erosion control improvements at Cummings Park were constructed in three phases:

- Approximately 1000 feet of beach was widened to 125 feet by the direct placement of sand;
- The length of the existing groin near the center of the beach was extended to 400 feet; and

- The inshore end of the existing jetty at the western end of the beach was raised two feet to 13 feet

The placement of sand was completed in October 1960, and the groin and jetty were completed in November 1960. The cost of the project was $80,700

Guilford Point Beach

Guilford Point is situated in the southeastern section of Guilford. The beach is located on the eastern side of Guilford Point, at the mouth of the East River

The project was built in two phases. They included

- The construction of a 300-foot-long groin at the east end of the beach in September 1957
- The widening of approximately 400 feet of beach to 125 feet by the direct placement of sand in September 1959

The total cost of the project was $46,900

Gulf Beach

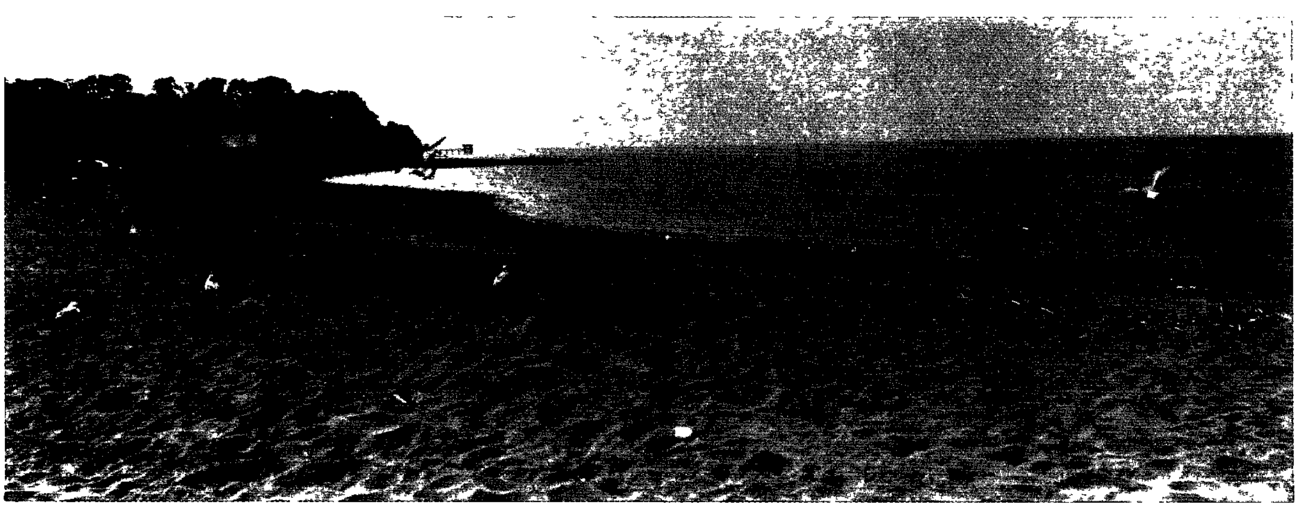
Gulf Beach is located on the eastern shore of Milford Outer Harbor, locally known as "The Gulf," near the mouth of the Wepawaug River in Milford

The beach erosion control project at Gulf Beach consisted of widening about 1200 feet of beach to 100 feet by the direct placement of sand. This work cost $64,000 and was completed in May 1957

Gulf Street

Gulf Street in Milford extends northward from Welches Point Road, immediately inshore of Gulf Beach, and crosses the lower end of Gulf Pond before terminating at U S Route 1

The project provides for 140 feet of stone slope protection that stabilizes the road embankment behind the



Gulf Beach in Milford

southern end of Gulf Beach. Gulf Street is a small project designed to prevent shoreline erosion, and was built under Section 14 of the Corps' Continuing Authorities Program.

The project was initiated and completed in the summer of 1987 at a cost of $200,000.

Hammonasset

Hammonasset Beach is located in Hammonasset State Park in Madison. The beach extends along the entire southwestern shore of Hammonasset Point.

Work on the project, completed in June 1955, consisted of:

- Widening a 10,000-foot stretch of beach by the direct placement of sand. The beach was widened by 50 feet at the east end, increasing to 100 feet approaching the west end.
- Constructing two training walls at Toms Creek on the western end of the beach. One wall is 320 feet long, and the other is 400 feet long.
- Constructing an 800-foot-long groin at Hammonasset Point on the eastern end of the beach.
- The project cost $489,600.

The stone slope protection on the Housatonic River in Salisbury helps to stabilize both the riverbank and Dugway Road.

Housatonic River, Salisbury

The Housatonic River project is located in the Amesville section of Salisbury. The project area is situated along the west bank of the Housatonic River adjacent to Dugway Road, between Falls Mountain Road and Brenton Hill Road.

The project consists of stone slope protection that strengthens a 350-foot reach of the riverbank, reducing erosion damage and stabilizing the roadway. It is a small project designed to prevent streambank erosion, and was built under Section 14 of the Corps' Continuing Authorities Program.

Construction took place between January-July 1981 and cost $102,800. The project is maintained by Salisbury.

Jennings Beach and Ash Creek

Jennings Beach is located at the mouth of Ash Creek in the eastern end of Fairfield.

The project at Jennings Beach is an 800-foot-long jetty at the northeastern end of the beach. It was constructed in 1951 at a cost of $43,200.

Lighthouse Point Park

Lighthouse Point Park is located at the entrance to New Haven Harbor at the southeastern tip of New Haven. A city-owned beach extends along the southern shore of the point to Morris Creek.

The project consists of a 380-foot-long groin on the western end of Lighthouse Point Beach. It was constructed in September 1958 at a cost of $11,800.

Middle Beach

Middle Beach is a narrow beach situated midway along the Madison shorefront, opposite Tuxis Island and immediately southward of the town center.

The project consists of a 20-foot-wide, 700-foot-long revetment. It was completed in May 1957 and cost $26,400.

Connecticut River, Middletown

Middletown is located approximately 15 miles south of Hartford and 20 miles northeast of New Haven. Middletown is bordered to the east by the Connecticut River.

Streambank erosion along the Connecticut River in the vicinity of River Road at the intersection with Eastern Drive is threatening a public road (River Road), a water main, and a sewage treatment facility. In order to protect the areas subject to the erosion, the Corps has designed a grid block revetment with a stone toe approximately 600 feet long and 11 feet high.

Construction of the revetment is scheduled for November 1991 through January 1992. The estimated cost of the project is $380,000. The project is authorized under Section 14, Emergency Streambank and Shoreline Protection of the Corps' Continuing Authorities Program.

Nonewaug River, Woodbury

The Nonewaug River project is located on the Nonewaug River in the North Woodbury section of Woodbury.

The project consists of a 210-foot-long gabion retaining wall along the left riverbank, with stone slope protection along its base. The retaining wall adds stability to the Middle Road Turnpike, which had been threatened by erosion. It is a small project designed to prevent streambank erosion, and was built under Section 14 of the Corps' Continuing Authorities Program.

Construction began in November 1983 and was finished in August 1984. The project cost $164,000.

Port V Facility, Bridgeport

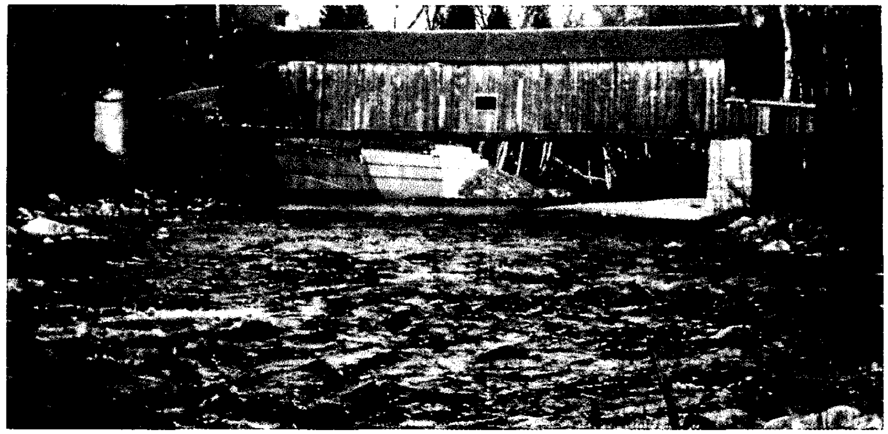
The Port V Facility of the National Association of Naval Veterans is located on the shorefront in Bridgeport.

The project consists of a stone retaining wall and stone slope protection constructed by the Corps over a 250-foot stretch of the shoreline. It protects the naval facility by limiting erosion caused by wave action. Port V is a small project and was built under Section 14 of the Corps' Continuing Authorities Program.

Construction took place between March-June 1984 and cost $160,000.

The gabion retaining wall on the Nonewaug River in Woodbury.

Stone slope protection and a stone retaining wall help safeguard the Port V Facility in Bridgeport.



The retaining wall on the Salmon River in Colchester was designed to enhance the theme presented by the Old Comstock Covered Bridge, a site listed on the National Register of Historic Places. The wall can be seen in the background.

Prospect Beach

Prospect Beach lies near the southwestern end of the West Haven shorefront, near New Haven Harbor.

The project, which was finished in May 1957 and cost $345,400, was completed in two steps:

- Approximately 6000 feet of beach was widened to 100 feet by the direct placement of sand (The south end of the beach was widened to 150 feet). The area of improvement begins at Ivy Street (about 1500 feet south of Bradley Point) and ends about 350 feet south of South Street.
- Eight groins, varying in length from 250 to 330 feet, were constructed.

Salmon River, Colchester

The Salmon River project lies along the right bank of the Salmon River, principally in the western limits of Colchester and continuing a short distance downstream into East Hampton.

The project, a retaining wall of precast concrete blocks resting on concrete footing, reduces erosion along a 250-foot stretch of the north riverbank. It protects Brown's Mill Road in Colchester and the right abutment of the Old Comstock Covered Bridge in East Hampton, a site listed on the National Register of Historic Places. The wall was designed to enhance the theme presented by the historical covered bridge setting.

The Salmon River project is a small project designed to prevent streambank erosion, and was built under Section 14 of the Corps' Continuing Authorities Program. It was constructed between May-September 1982, and cost $246,500.

Sasco Hill Beach

Sasco Hill Beach in Fairfield extends eastward from the breakwater at the east side of the Southport Harbor entrance to Kensie Point.

The project involved:

- Constructing a 400-foot-long groin at the western end of the widened beach area. This was completed in May 1958.
- Widening about 900 feet of the central portion of the beach to 100 feet by the direct placement of sand. This was completed in July 1958.

The total cost of the project was $71,300.

Sea Bluff Beach

Sea Bluff Beach, bounded by Cove River and Pleasant Beach, lies along the westerly side of New Haven Harbor in the city of West Haven.

This erosion control project was completed in January 1991 at a cost of $323,000 and involved the following work:

- Approximately 1,000 feet of beach was widened by direct placement of about 14,300 cubic yards of sand to produce approximately 122 feet of usable beach above mean high water.

Sasco Hill Beach in Fairfield.

- Reconstruction of the Ivy Street Groin using approximately 480 tons of core stone and approximately 500 tons of armor stone, widening and raising the groin about one foot in elevation and adding approximately 40 feet in length.
- Planting of about 10,500 square feet of beach grass.
- Setting up 470 linear feet of sand trap fence and, along the parking area, installing approximately 425 linear feet of timber curbing.

With proper operation and maintenance, this project is expected to provide erosion protection for Ocean Avenue for many years to come, while allowing the community to enjoy this renewed resource.

Seaside Park

Seaside Park in Bridgeport extends about two miles westward from Breezy Point at Bridgeport Harbor to the breakwater on Fayerweather Island, on the eastern side of Black Rock Harbor.

The project consists of approximately 8800 feet of beach widened to 125 feet by the direct placement of sand. It was completed in April 1957 and cost $480,000.

Sherwood Island State Park

Sherwood Island State Park in Westport is part of Sherwood Island, a low coastal area separated from the mainland by Sherwood Pond to the west and small tidal creeks to the east. The park has two beaches that lie on either side of Sherwood Point—Alvord Beach on the east and Elwood Beach on the west.

The Corps has helped to control erosion on the Alvord and Elwood Beaches with two major projects constructed at different times. The first project, which cost $600,000, consists of:

- A 500-foot-long groin at the western end of Elwood Beach. This was built in October 1956.
- Two training walls at Burial Hill Creek, situated on the eastern end of the beach. The walls, which have lengths of 400 and 500 feet, were constructed in February 1957.
- The widening of both beaches (A total of 6000 feet of shoreline) to 150 feet by the direct placement of sand. About 2000 feet of beach (1000 feet east and 1000 feet west of Sherwood Point) was widened an additional 100 feet. This work was completed in June 1957.

The second major improvement was a small project, built under Section 103 of the Corps' Continuing Authorities Program. It was completed in January 1983 and cost $1.5 million. This work involved:

- Widening 1800 feet of Elwood Beach, from the western groin to Sherwood Point.
- Constructing a 430-foot-long groin about 900 feet west of Sherwood Point.
- Lowering the height of the western groin's landward end.

Short Beach

Short Beach is located in Stratford, immediately north of Stratford Point, at the western side of the mouth of the Housatonic River. It fronts a major marshland area.

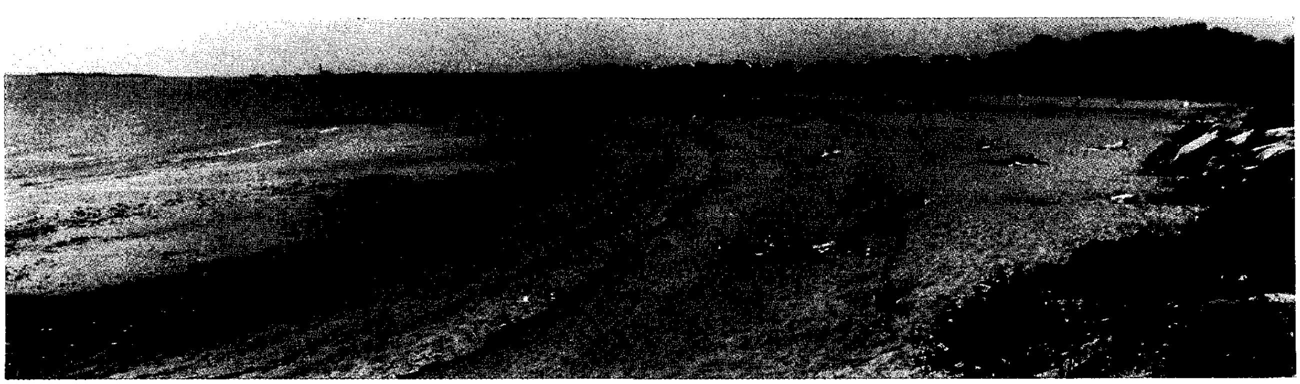
The project at Short Beach involved the widening of about 2500 feet of beach to 125 feet by the direct placement of sand. The sand was obtained from the Housatonic River at no cost to the federal government because of Corps' dredging activities underway at that time.

The widening of the beach was completed in June 1955.

Silver Beach to Cedar Beach

This project helps to stem beach erosion at a series of contiguous beaches in Milford, extending from Meadows End (opposite Charles Island) to the vicinity of the mouth of the Housatonic River. The beaches include Silver Beach and Meadows End (both part of Silver Sands State Park) as well as Myrtle, Walnut, Laurel, and Cedar Beaches.

The project originally called for widening 15,600 feet of shore surrounding these beaches to 100 feet by the direct



Sherwood Island State Park in Westport.

Southport Beach in Fairfield.

placement of sand (Meadows End would be widened to 150 feet). Eleven groins would be constructed to help retain sand if found to be needed.

In June 1955, Cedar Beach and the western end of Laurel Beach were widened to 100 feet. Sand for this part of the project was obtained from the Housatonic River at no cost to the federal government because of Corps' dredging activities underway at that time. In 1960, parts of Silver and Myrtle Beaches (about 4500 feet) were widened to 100 feet, and Meadows End was widened to 250 feet. The cost of this work was $335,000.

The widening of Walnut Beach and the rest of Silver, Myrtle, and Laurel Beaches, as well as the construction of the groins, have yet to be completed pending notification to the Corps from state officials.

Farmington River, Simsbury

Simsbury is located in north-central Connecticut, approximately 25 miles east of the New York-Connecticut state line and 14 miles northwest of the city of Hartford.

Streambank erosion along the Farmington River is threatening an existing 36 inch main trunk sewer line which is located along the side of a hill adjacent to and west of the river. In order to protect the sewer main from significant damage, the Corps has designed a stone revetment approximately 900 feet long.

Construction of the revetment is scheduled for late summer 1992. The estimated cost of the project is $445,000. The project is authorized under Section 14, Emergency Streambank and Shoreline Protection of the Corps' Continuing Authorities Program.

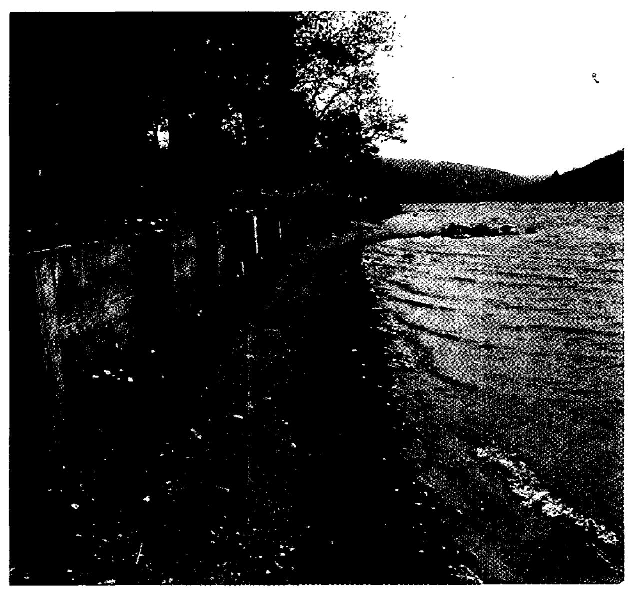
Southport Beach

Southport Beach in southwestern Fairfield extends about 2200 feet west from Southport Harbor to Sasco Brook, which marks the Fairfield-Westport town line.

The project involved:

- Constructing a 400-foot-long groin at the western end of the widened beach area. This was completed in 1956.
- Widening about 700 feet of the beach to 100 feet by the direct placement of sand. This was completed in July 1958.

The total cost of the project was $52,900.



Squantz Pond in New Fairfield.

Squantz Pond, New Fairfield

Squantz Pond is located along the eastern flank of Squantz Pond State Park in New Fairfield.

The project consists of a timber bulkhead with sand and gravel fills constructed along 1200 feet of the pond's southern end. It is a small project designed to prevent shoreline erosion, and was built under Section 14 of the Corps' Continuing Authorities Program.

The project began in September 1982 and was completed in November 1983. Construction costs totalled $115,400.

Woodmont Shore

Woodmont Shore is located in Milford in the borough of Woodmont. It includes a small pocket beach immediately west of Merwin Point and a larger beach extending northward from Merwin Point to the vicinity of the Oyster River.

The beach erosion control project, which was finished in June 1959 and cost $165,500, was completed in three steps:

- About 500 feet of shore in the beach area west of Merwin Point was widened to 100 feet by the direct placement of sand;
- Approximately 3500 feet of shore, stretching north from Chapel Street at Merwin Point to an area about 400 feet north of Anderson Avenue, was widened to 100 feet; and
- Five groins 300-400 feet long were constructed.

STUDIES

Studies

Before taking measures to resolve a water resources problem, the Corps will study the affected area to determine if a project is feasible. The study examines a wide range of potential solutions based on their economic and engineering practicality, acceptability, and impact on the environment.

Listed below are areas in Connecticut where the Corps has examined the feasibility of building major projects for flood damage reduction, navigation, or shore and bank protection purposes.

Flood Damage Reduction

Housatonic River Basin

The Corps investigated flood control and water supply problems of 22 communities in the Housatonic River Basin, including Bridgeport, Waterbury, and Danbury, Connecticut and Pittsfield, Massachusetts. This area is experiencing rapid population, industrial, and commercial growth, with accompanying water resource problems and needs.

For flood control, the study recommended the development of a floodplain management program to regulate future development in the floodplain. It was also recommended that additional studies for flood damage reduction be coordinated through the Continuing Authorities (Small Projects) Program. Information developed from the study regarding water supply demands and needs was made available to Connecticut, Massachusetts, and other interests as a guide for future action.

Long Island Sound

Ocean storm surges and wind-driven waves have caused high tide levels and flooding along a 30-mile stretch of the Long Island Sound coastline in central Connecticut. Connecticut officials have identified this reach as the state's highest coastal flood hazard area. The coastal reach cuts across eight communities: Westport, Fairfield, Bridgeport, Stratford, Milford, West Haven, New Haven, and East Haven. The area is characterized by residential areas bordering on long stretches of beach and waterfront, as well as commercial and industrial development (mostly in Bridgeport and New Haven).

The purpose of the Corps' study is to determine the feasibility of measures to reduce tidal flood damages and to guide the prudent use of coastal or estuarine flood areas. As part of the study, flooding problems along the Thames River estuary in the Thamesville section of Norwich were investigated and examined. The results indicated that flood warning and evacuation measures, implemented by the city, would provide the maximum net benefits for the area.

The study is continuing.

Rippowam River

Design plans are continuing for a flood control plan on the Rippowam River in Stamford. The project, to be constructed under Section 205 of the Continuing Authorities (Small Projects) Program, involves the modification of Main Street Dam by the Corps and nonstructural measures to be implemented by the city.

When completed, the project will protect the highly urbanized area along the lower two miles of the river.

Navigation

Stonington Harbor

The Corps has completed a reconnaissance level study of navigation improvements to Stonington Harbor. The study, prepared under Section 107 of the Continuing Authorities Program, recommends a detailed feasibility study of wave protection improvements for the commercial fishing fleet. The town of Stonington is pursuing funds for which to participate in the cost-shared study.

Shore and Bank Protection

East Haven

The Corps is presently conducting a reconnaissance study of the shoreline running east from Caroline Creek to Bradford Creek. This area includes Silver Sands Beach and Momaguin Beach. The study is scheduled for completion in 1991 and is being conducted under Section 103 of the Continuing Authorities Program.

Prospect Beach

This study, prepared under Section 103 of the Continuing Authorities Program, found shore protection improvements at Prospect Beach to be in the Federal interest. Plans call for widening and elevating the beach. A Detailed Project Report is pending approval as the basis for project plans and specifications.

Woodmont Beach

A cost shared feasibility study under Section 103 of the Corps Continuing Authorities Program was completed in 1990. The recommended plan of improvement will provide additional shore protection by widening and elevating the beach. Once project plans and specifications are approved, construction will begin pending receipt of the necessary local assurances.

APPENDIX

Communities with Corps Projects

The communities listed below have either Corps' lands or Corps-built projects lying within their borders. The listing indicates the project name, its purpose (Flood Damage Reduction, Navigation, or Shore and Bank Protection), and the page number in this booklet where the project is described.

Community	Project Name	
Ansonia	Ansonia Local Protection Project (Flood Damage Reduction)	46
Branford	Branford Harbor (Navigation)	57
	Stony Creek (Navigation)	68
Bridgeport	Black Rock Harbor (Navigation)	56
	Bridgeport Harbor (Navigation)	57
	Port V (Shore and Bank Protection)	77
	Seaside Park (Shore and Bank Protection)	79
Chaplin	Mansfield Hollow Lake (Flood Damage Reduction)	36
Chester	Connecticut River (Navigation)	58
Clinton	Clinton Harbor (Navigation)	58
	Duck Island Harbor (Navigation)	60
Colchester	Salmon River (Shore and Bank Protection)	78
Colebrook	Colebrook River Lake (Flood Damage Reduction)	32
Cromwell	Connecticut River (Navigation)	58
Danbury	Danbury Local Protection Project (Flood Damage Reduction)	46
Darien	Fivemile River Harbor (Navigation)	60
Deep River	Connecticut River (Navigation)	58
Derby	Derby Local Protection Project (Flood Damage Reduction)	47
	Housatonic River (Navigation)	62
Dudley, MA	West Thompson Lake (Flood Damage Reduction)	38
East Derby	Housatonic River (Navigation)	62
East Haddam	Connecticut River (Navigation)	58
East Hampton	Connecticut River (Navigation)	58
	Salmon River (Shore and Bank Protection)	78
East Hartford	East Hartford Local Protection Project (Flood Damage Reduction)	48
	Connecticut River (Navigation)	58
East Haven	New Haven Harbor (Navigation)	63
East Lyme	Niantic Bay and Harbor (Navigation)	65
Essex	Connecticut River (Navigation)	58
Fairfield	Jennings Beach and Ash Creek (Shore and Bank Protection)	76
	Sasco Hill Beach (Shore and Bank Protection)	78
	Southport Beach (Shore and Bank Protection)	80
	Southport Harbor (Navigation)	67
Glastonbury	Connecticut River (Navigation)	58
Goshen	Hall Meadow Brook Dam (Flood Damage Reduction)	33

Community	Project Name	
Greenwich	Byram River Local Protection Project (Flood Damage Reduction)	46
	Greenwich Harbor (Navigation)	61
	Mianus River (Navigation)	62
Groton	Mystic River (Navigation)	62
	Thames River (Navigation)	68
Guilford	Guilford Harbor (Navigation)	61
	Guilford Point Beach (Shore and Bank Protection)	75
Haddam	Connecticut River (Navigation)	58
Hartford	Connecticut River (Navigation)	58
	Hartford Local Protection Project (Flood Damage Reduction)	48
Harwinton	Thomaston Dam (Flood Damage Reduction)	38
Ledyard	Thames River (Navigation)	68
Litchfield	Northfield Brook Lake (Flood Damage Reduction)	37
	Thomaston Dam (Flood Damage Reduction)	38
Lyme	Connecticut River (Navigation)	58
Madison	Hammonasset Beach (Shore and Bank Protection)	76
	Middle Beach (Shore and Bank Protection)	76
Mansfield	Mansfield Hollow Lake (Flood Damage Reduction)	36
Middlebury	Hop Brook Lake (Flood Damage Reduction)	35
Middletown	Connecticut River (Navigation)	58
Milford	Gulf Beach (Shore and Bank Protection)	75
	Gulf Street (Shore and Bank Protection)	75
	Housatonic River (Navigation)	62
	Milford Harbor (Navigation)	62
	Silver Beach to Cedar Beach (Shore and Bank Protection)	79
	Woodmont Shore (Shore and Bank Protection)	81
Montville	Thames River (Navigation)	68
Naugatuck	Hop Brook Lake (Flood Damage Reduction)	35
New Fairfield	Squantz Pond (Shore and Bank Protection)	81
New Haven	Lighthouse Point Park (Shore and Bank Protection)	76
	New Haven Harbor (Navigation)	63
New London	New London Harbor (Navigation)	64
	New London Hurricane Protection Barrier (Flood Damage Reduction)	42
	Thames River (Navigation)	68
North Canaan	North Canaan Local Protection Project (Flood Damage Reduction)	49
Norwalk	Calf Pasture Beach (Shore and Bank Protection)	74
	Fivemile River Harbor (Navigation)	60
	Wilson Point Harbor (Navigation)	71
	Norwalk Harbor (Navigation)	65
	Norwalk Local Protection Project (Flood Damage Reduction)	49
Norwich	Norwich Local Protection Project (Flood Damage Reduction)	49
	Thames River (Navigation)	68
Old Saybrook	Connecticut River (Navigation)	58

Community	Project Name	
Old Lyme	Connecticut River (Navigation)	58
Plymouth	Hancock Brook Lake (Flood Damage Reduction)	34
	Thomaston Dam (Flood Damage Reduction)	38
Portland	Connecticut River (Navigation)	58
Rocky Hill	Connecticut River (Navigation)	58
Salisbury	Housatonic River (Shore and Bank Protection)	76
Sandisfield, MA	Colebrook River Lake (Flood Damage Reduction)	32
Saugatuck	Westport Harbor and Saugatuck River (Navigation)	71
Shelton	Housatonic River (Navigation)	62
Stamford	Cove Island Beach (Shore and Bank Protection)	74
	Cummings Park Beach (Shore and Bank Protection)	74
	Stamford Harbor (Navigation)	68
	Stamford Hurricane Protection Barrier (Flood Damage Reduction)	43
	Westcott Cove (Navigation)	70
Stonington	Mystic River (Navigation)	62
	Pawcatuck Hurricane Protection Barrier (Flood Damage Reduction)	42
	Pawcatuck River and Little Narragansett Bay (Navigation)	66
	Stonington Harbor (Navigation)	68
Stratford	Housatonic River (Navigation)	62
	Short Beach (Shore and Bank Protection)	79
Thomaston	Black Rock Lake (Flood Damage Reduction)	32
	Northfield Brook Lake (Flood Damage Reduction)	37
	Thomaston Dam (Flood Damage Reduction)	38
Thompson	West Thompson Lake (Flood Damage Reduction)	38
Tolland, MA	Colebrook River Lake (Flood Damage Reduction)	32
Torrington	East Branch Dam (Flood Damage Reduction)	33
	Hall Meadow Brook Dam (Flood Damage Reduction)	33
	Torrington (East Branch) Local Protection Project (Flood Damage Reduction)	50
	Torrington (West Branch) Local Protection Project (Flood Damage Reduction)	51
Waterbury	Hop Brook Lake (Flood Damage Reduction)	35
	Waterbury/Watertown Local Protection Project(Flood Damage Reduction)	51
Waterford	Niantic Bay and Harbor (Navigation)	65
	Thames River (Navigation)	68
Watertown	Black Rock Lake (Flood Damage Reduction)	32
	Waterbury/Watertown Local Protection Project (Flood Damage Reduction)	51
West Chester, N.Y.	Port Chester Harbor (Navigation)	67
West Haven	New Haven Harbor (Navigation)	63
	Prospect Beach (Shore and Bank Protection)	78
Westbrook	Patchogue River (Navigation)	66
Westport	Burial Hill Beach (Shore and Bank Protection)	74
	Compo Beach (Shore and Bank Protection)	74
	Sherwood Island State Park (Shore and Bank Protection)	79
	Westport Harbor and Saugatuck River (Navigation)	71

Community	Project Name	
Wethersfield	Connecticut River (Navigation)	58
	Folly Brook Local Protection Project (Flood Damage Reduction)	48
Winchester	Mad River Lake (Flood Damage Reduction)	52
	Sucker Brook Dam (Flood Damage Reduction)	37
	Winsted Local Protection Project (Flood Damage Reduction)	53
Windham	Mansfield Hollow Lake (Flood Damage Reduction)	36
Woodbury	Nonewaug River (Shore and Bank Protection)	77

Glossary

Anchorage—an area dredged to a certain depth to allow boats and ships to moor or anchor.

Bedrock—rock of relatively great thickness lying in its native location.

Breakwaters—structures, usually built offshore, that protect the shoreline, harbor, channels, and anchorages by intercepting the energy of approaching waves.

Bulkheads—steel sheet piling or timber walls that prevent sliding of the land and protect the streambank or shoreline from erosion.

Conduits—concrete tunnels or pipes that divert floodwaters around or under potential flood damage sites.

Culverts—large pipes, usually constructed below bridges and other water crossings, that allow water to pass downstream and provide support to the crossing.

Dikes—earthfill barriers that confine floodwaters to the river channel, protecting flood prone areas.

Drainage Area—the total land area where surface water runs off and collects in a stream or series or streams that make up a single watershed.

Drop Structure—a device in a stream or channel that prevents water from rising above a certain elevation. Once water reaches a certain level, excess water passes over the structure and is diverted to another body of water.

Earthfill—a well graded mixture of soil containing principally gravel, sand, silt, and clay, which is used with other materials to construct dams, dikes, and hurricane protection barriers.

Environmental Assessment—an examination of the positive and adverse impacts on the environment of a proposed water resources solution and alternative solutions.

Environmental Impact Statement—a detailed environmental analysis and documentation of a proposed water resources solution when the proposed solution is expected to have a significant effect on the quality of the human environment or the area's ecology.

Feasibility Study—a detailed investigation, conducted after the reconnaissance study is completed, that recommends a specific solution to a water resource problem.

Floodplain—the land adjoining a river, stream, ocean, or lake that is likely to be flooded during periods of excess precipitation or abnormal high tide.

Floodproofing—structural measures incorporated in the design of planned buildings or alterations added to existing ones that lessen the potential for flood damage. For example, existing structures could have their basement windows blocked, or structures in the design stage could be built on stilts or high foundations.

Floodwalls—reinforced concrete walls that act as barriers against floodwaters and confine them to the river channel, protecting flood prone areas. Floodwalls are usually built in areas with a limited amount of space.

Gabion Wall—a retaining wall constructed of stone-filled wire mesh baskets.

Groins—structures that extend perpendicular from the shore in a fingerlikemanner to trap and retain sand, retarding erosion and maintaining shore alignment and stability.

Hurricane Protection Barriers—structures built across harbors or near the shoreline that protect communities from tidal surges and coastal storm flooding. They are often constructed with openings for navigational purposes.

Intake Structure—found at the entrance to a conduit or other outlet facility, an intake structure allows water to drain from a reservoir or river and is equipped with a trash rack or other feature that prevents clogging from floating debris.

Jetties—structures that stabilize a channel by preventing the buildup of sediment and directing and confining the channel's tidal flow. Jetties are usually built at the mouth of rivers and extend perpendicular from the shore.

Outlet Works—gated conduits, usually located at the base of a dam, that regulate the discharge of water.

Pumping Station—a structure containing pumps that discharges floodwaters from a protected area over or through a dike or floodwall and into a river or ocean.

Reconnaissance Study—a preliminary study that examines a wide range of potential solutions to a water resources problem, each of which is reviewed for its economic and engineering practicality, acceptability, and impact on the environment.

Recreation Pool—any permanent body of water impounded by a dam that offers recreational opportunities or promotes fishery and wildlife habitat.

Retaining Walls—walls made of stone, reinforced concrete, precast concrete blocks, or gabion that support streambanks weakened by erosion.

Revetment—a facing of stone or concrete constructed along a backshore or riverbank to protect against erosion or flooding.

Sand Drain—a layer of pervious materials, such as sand and gravel, placed beneath the downstream section of a dam that carries seepage to the dam's downstream limits and out into the stream.

Sand Replishment—quantities of sand placed on a shoreline to restore or widen a beach's dimensions. Sand replenishment strengthens beaches affected by erosion, protects the backshore from wave action, and stops the inland advance of water.

Seawall—a reinforced concrete wall built along a shoreline to protect against erosion or flooding.

Snagging and Clearing—the removal of accumulated snags and debris, such as fallen trees, dead brush, and silt, from river and stream channels. Snagging and clearing improves a channel's flow capacity and eliminates a potentially dangerous flood situation.

Spillway—a channel-shaped structure, usually made of concrete or excavatedin rock, that allows water exceeding the storage capacity of a reservoir to pass through or around a dam instead of overtopping it.

Stone Slope Protection—a layer of large stones, usually underlain by a layer of gravel bedding, designed to prevent erosion from streamflow, wave attack, and runoff.

Stoplog Structure—a designed opening in a floodwall or dike that allows the passage of water during non-flood periods but closes during flood periods to prevent flooding downstream. Stoplog structures can be made of wood or steel or concrete beams.

Training Dike—a structure extending from the shore into the water that redirects the current, preventing sediment from settling and ensuring that adequate depths are maintained.

Training Wall—a structure built along channel banks to narrow the channel area, thereby controlling the velocity of the flow of water and preventing the buildup of sediment. Training walls and training dikes have the same purpose: to ensure adequate depths are maintained.

Vehicular Gate—an opening in a dike or floodwall that allows rail cars or other vehicles to pass over the structure during nonflood periods. Vehicular gates can be closed during flood periods by either stoplogs or large steel gates.

Weir—a concrete structure designed as part of the spillway that allows water to flow from the reservoir and over the spillway.

Index

Ansonia Local Protection Project 46
Appendix 85
Authorization and Planning Process for Water Resources Projects 6

Black Rock Harbor 56
Black Rock Lake 32
Branford Harbor 57
Bridgeport Harbor 57
Burial Hill Beach 74
Byram River, Greenwich Local Protection Project 46

Calf Pasture Beach 74
Clinton Harbor 58
Civil Works Overview 3
Colebrook River Lake 32
Communities with Corps' Projects (Alphabetical Listing) 86
Compo Beach 74
Connecticut River 58
Connecticut River Basin 27
Connecticut River, Middleton 76
Cove Island Beach 74
Cummings Park Beach 74

Dams and Reservoirs 31
Danbury Local Protection Project 46
Derby Local Protection Project 47
Description of Projects 23
Duck Island Harbor 60

East Branch Dam 33
East Hartford Local Protection Project 47
East Haven Study 84
Emergency Response and Recovery 21
Environmental Quality 18

Farmington River, Simsbury 80
Fivemile River Harbor 60
Flood Control and Flood Plain Management 7
Flood Damage Reduction (Projects) 30
Flooding in New England 9
Folly Brook, Wethersfield Local Protection Project 48

Glossary 90
Greenwich Harbor 61
Guilford Harbor 61
Guilford Point Beach 75
Gulf Beach 75
Gulf Street 75

Hall Meadow Brook Dam 33
Hammonasset Beach 76
Hancock Brook Lake 34
Hartford Local Protection Project 48
Hop Brook Lake 35
Housatonic River Basin 84
Housatonic River Basin Study 84
Housatonic River 62
Housatonic River, Salisbury 76
Hurricane Protection Barriers 41
Hydropower 17

Introduction 4

Jennings Beach and Ash Creek 76

Lighthouse Point Park 76
Long Island Sound Study 84

Mad River, Waterbury (Woodtick) 52
Mansfield Hollow Lake 36
Mianus River 62
Middle Beach 76
Milford Harbor 62
Mystic River 62

Navigation (General) 54
Navigation (Projects) 55
New Haven Harbor 63
New London Harbor 64
New London Hurricane Protection Barrier 42
Niantic Bay and Harbor 65
Nonewaug River, Woodbury 77
North Canaan Local Protection Project 49
Northfield Brook Lake 37
Norwalk Local Protection Project 49
Norwalk Harbor 65
Norwich Local Protection Project 50

Patchogue River 66
Pawcatuck River and Narragansett Bay 66
Pawcatuck Hurricane Protection Barrier 42
Pawcatuck River Basin 28
Port Chester Harbor 67
Port V Facility, Bridgeport 77
Prospect Beach 78
Prospect Beach Study 84

Recreation 20
Regulatory Programs 19
Rippowam River Study 84
River Basins 25

Salmon River, Colchester 78
Sasco Hill Beach 78

Seaside Bluff Beach 78
Seaside Park 79
Sherwood Island State Park 79
Shore and Bank Protection (Projects) 73
Short Beach 79
Silver Beach to Cedar Beach 79
Southport Beach 80
Southport Harbor 67
Squantz Pond, New Fairfield 81
Stamford Harbor 68
Stamford Hurricane Protection Barrier 43
Stonington Harbor 68
Stonington Harbor Study 84
Stony Creek 68
Studies 84
Sucker Brook Dam 37

Thames River 68
Thames River Basin 29
Thomaston Dam 38
Torrington (East) Local Protection Project 50
Torrington (West) Local Protection Project 51

U.S. Army Corps of Engineers Programs and Services 1

Water Supply 18
Waterbury/Watertown Local Protection Project 51
Westcott Cove 70
Westport Harbor and Saugatuck River 71
West Rive, New Haven 52
West Thompson Lake 38
Wilson Point Harbor 71
Winsted Local Protection Project 53
Woodmont Beach Study 84
Woodmont Shore 81

Public Affairs Office
New England Division
U.S. Army Corps of Engineers
424 Trapelo Road
Waltham, MA 02254-9149

Meter Code 40

Bulk Rate
U.S. Postage
Paid
Waltham, MA
Permit No. 56723

S

Office of Ocean and Resource Management
U.S. Dept. of Commerce
3300 Whitehaven St NW
Washington, DC 20235-0001